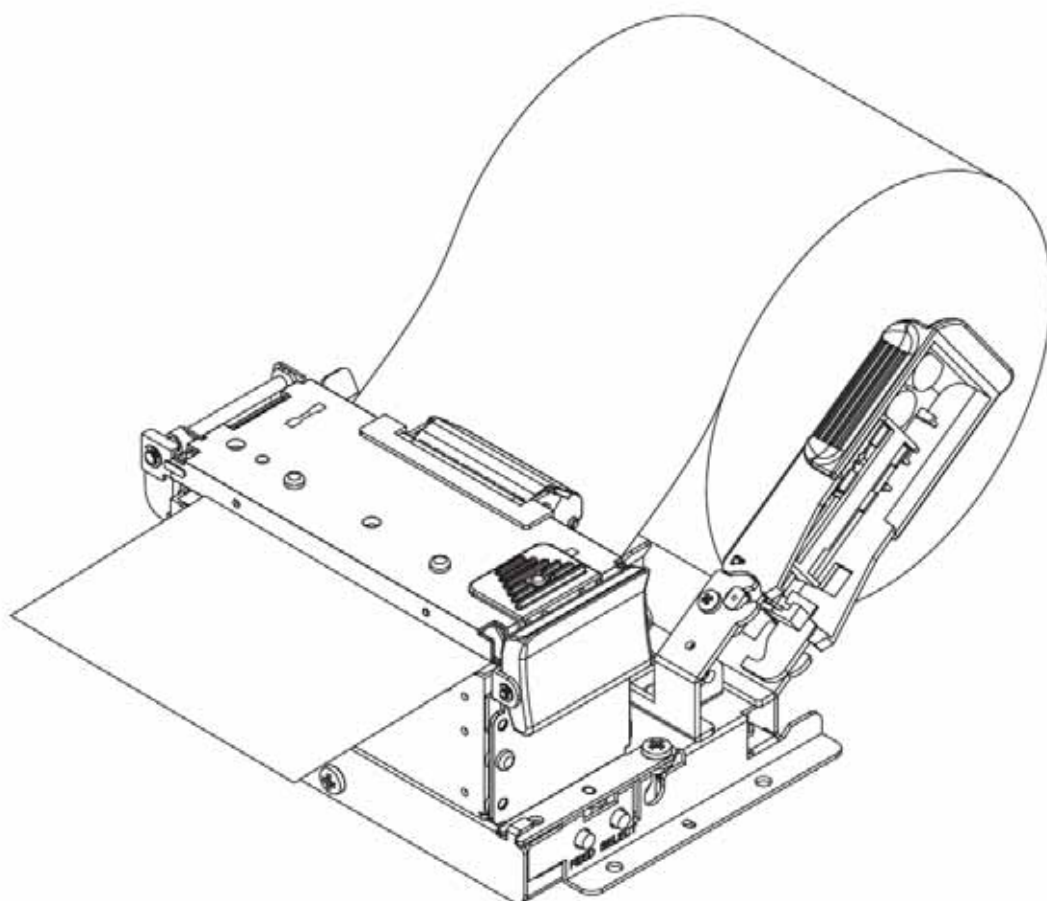**LINE THERMAL PRINTER**

SK1-21
SK1-31

SANEI ELECTRIC INC.

Rev2.2

DECLARATION OF CONFORMITY

Manufacturer's Name: Sanei Electric Inc.

Manufacturer's address: 5Floor, Taisou Ikebukuro Building, 2-61-1 Ikebukuro, Toshima-Ku, Tokyo 171-0014, Japan

Product Name: Thermal Printer

Model Number: SK1-31

Accessories: SA13A240 / AC/DC adapter and Power cord

The product complies with the following product standards.

CE

EN 55022: 2006+A1 :2007,Class A
EN 61000-3-2: 2006, Class A
EN 61000-3-3: 1995+A1: 2001+A2 : 2005
EN 55024: 1998+A1: 2001+A2: 2003
* In accordance with the council directive 2004/108/EC.

FCC

FCC Part 15 Subpart B, Class A

VCCI

VCCI, Class A

Declared by

_____

General notice

* The specifications may be changed for product improvement without notice.
* Updated information listed on our website. http://www.sanei-elec.co.jp
* Sanei shall not be responsible for any damages attributable to incorrect operation, handling or improper operation environments, except those specified in this manual.
* Sanei shall not be responsible for any claim of infringement or alleged infringement of patents, designs, trademarks, copyrights or other rights brought by a third party in relation to its products.
* Operate this printer only in the manners as described in the Technical guide. Otherwise, accidents or problems could possibly occur.
* Data are basically temporary; they cannot be stored or saved either for a long time or permanently. Please note that Sanei Electric shall not be responsible for any damages or lost profits resulting from the loss of data attributable to accidents, repairs, tests, and so on.
* If you have any questions, or notice any clerical errors or omissions regarding the information in the technical guide, please contact your dealer.
* Please note that Sanei Electric shall not be responsible for any results or effects resulting from operation of this Printer even if the information in the Technical guide.

■ Precautions

Symbol display

To use this equipment safety, or to protect the equipment from damage, the following symbols are used throughout this manual to highlight safety information

⚠ Warning	The symbol indicates that failure to observe these instructions or mishandling of this equipment could lead to severer injury or death
⚠ Caution	The symbol indicates that failure to observe these instructions or mishandling of this equipment could lead to injury or only property damage.

Samples of symbol

⚠	The symbol indicates caution(including DANGER or WARNING).
🚫	The symbol indicates the action is prohibited.
❗	The symbol indicates a required operation that must be performed.

When using the printer

🚫	Do not subject the printer to strong shocks by dropping or hitting it.
	Avoid using the printer at the following location. It may cause failure. 　Locations with much dust, particles, water or oil. 　Locations with slanted surfaces or strong vibration. 　Locations with direct sunlight. 　Locations with temperatures of below -25　, a relative humidity of 90　 or more, 　 dew condensation caused by extreme temperature change. 　Location with electromagnetic noise or corrosive gas.
	Do not touch the dot line on the thermal head and driver IC with metal and sandpaper etc. There is a possibility for damage of those parts.
	Do not touch the dot line on the thermal head with your fingures. The contamination may reduce the printing quality.
	Do not use the printer if there is condensation occurs on the thermal head. If the condensation occurs, keep the power off until condensation evaporates completely.
	Do not block the paper exit of the printer.
	Do not use a volatile chemical such as thinner or benzene.for maintenance work.

$\bigcirc$	Do not pull the paper end from the exit forcedly when the printer cover is closed.
$\mathbf{0}$	Turn off the printer power when trouble such as a paper jam occurs.
	Do not use loose paper. It may cause paper jam.
	Be careful of handling the thermal head to prevent heat elements and driver IC from exposure to static electricity.

When setting the printer

$\triangle$	The details such as the setting positions of the printer shall be reffered to " -8 Dimansions" Set the printer horizontally to the level, and make sure so the level not to be slanted.

Handling printer unit

	⚠ Warning
$\bigcirc$	Never disassemble or repair the printer ,AC adapter or power cord by yourself. Do not use any AC adapter and power cord other than those specified. Do not bend the AC power cord or place heavy objects on it. Doing so may damage the cord and cause fire or electric shock. Never use a damaged AC power cord. It may cause fire or electric shock.
	Do not drop any metalic objects nor spill coffee,water or any other liquid. Do not use the printer in a places where it will be exposed to excess moisture or water spray. It may result in electric shock, short circuit and failure. Do not connect or disconnect the ACadapter with wet hands. It may result in electric shock, short circuit and failure.

	⚠ Caution
$\bigcirc$	As the thermal head may be very hot immediately after printing, do not touch it to avoid burning your fingers. Be sure that the thermal head is cool before replacing a paper or cleaning the thermal head.
	Do not open the paper cover while printing.
	Do not pull the paper when the cover is closed.
$\mathbf{0}$	In the following cases, turn the printer power OFF and unplug the AC power cord from the outlet. Smoke, unusual noises or odd smells are emittied by the printer. When metallic objects is dropped or any liquid is spilled inside the printer. Continueous use may lead to printer failure,fire and electric shock. Make sure the fault does not continue and contact dealers for further assistance.
	If the printer is not to be used, turn the printer power OFF and leave the AC adapter disconnected from the outlet.

	Remove the interface cable or AC adapter from the connector or the receptacle by gripping the connector or the AC plug. Never pull the cable itself. Doing so may damage the cable or adapter.

Handling Paper Roll

❗	Use the specified paper or equivalent. Use of other paper may reduce life of the thermal head and cause a decrease in printing quality Especially sodium(Na+) potassium(K+) and chlorine(Cl-) containing substances can remarkably reduce the life of the thermal head.
	Store the paper in a dry, cool and dark place.
	When pasting printed pages, use water-bnased glue. (starch glue, synthetic glue, etc.)

🚫	The surface of thermal paper has been specially treated with a chemical agent to produce coloring by thermal chemical reaction.
	    Do not expose the paper for a long time under bright light.
	    Avoid storing in high temperature, high humidity,damp area and
	     direct sunlight.
	    Do not rub the paper with hard objects.
	    Keep the paper away from organic solvents.
	    Do not let the paper touch vinyle chloride film, erasers or adhesive tapes for hours.
	    Do not place he paper on diazo print paper or wet, freshly made paper copies.
	    Do not touch the paper with wet hands. It may cause fingerprint to be marks on the
	     paper or smudges.

■ Table of contents

1   General Outlines

1- 1   Product Outlines

SK1-21(2")/31(3") Series is the thermal type Kiosk Printer for the data to be input by computers and other host systems through Serial(RS232C) and USB.
The versatile functions built in the series make it possible to use for several data outputapplications.

1- 2   Features

- ■ Small and Ultra-Light Weight, Designed for wide variety of systems and equipments
- ■ Max 200mm/sec high-speed printing
- ■ Flexible 3-directions paper setting to be designed to the different installation position
- ■ Variety of paper core holders (adjustable for 3 different rolls)
- ■ Available for Barcode printing and 2-dimensions code printing
- ■ Max φ102mm paper roll as standard specifications
- ■ Various Sensors built-in : Paper near end, Paper empty, Head open sensor, Black-Mark sensor (Option), Gap sensor (Option)
- ■ Wide variety of paper size (58, 60, 80, 83mm)
- ■ Autoloading function
- ■ Versatile operationg environment

Other functions

- Capable of HEX dump printing and test printing.
- Line spacing can be freely adjusted.
- Graphic printing by bit image.
- Downloaded characters and user-defined characters can also be printed.
- Paper feed amount can be set freely.
- With Ruled Line command, table layouts can be easily printed.
- Page Mode allows erect/inverse images, clockwise 90 degrees/counterclockwise 90 degrees and overlapping printing.
- Page Mode allows setting the paper length to a maximum of 300mm.
- Using the Image Registration command, the printing layout can be set up beforehand.
- With the Printing Density command, the printing density can be changed.
- The command system conforms to ESC/POS.
- Capable of registering print images in internal flash memory.

The product is classified according to the Product Number, as an example as below:

SK1-31 S J 3 - 3 M Q B

Option
   B   Bezel
   P   Presenta

2-Dimensions Barcode
   Q   Installed
   Without Q   Not available

Paper Core Diameter
   M   φ17mm
   L   φ25.4mm
   Without M/L   φ12mm

Paper Width
   1   58.0mm
   2   60.0mm
   3   83.0mm
   Without 1/2/3   80.0mm

Sensor
   1:   Black mark   Right
   2:   Black mark   Left
   3:   Gap sensor
   4:   Gap sensor & Black mark   Right
   5:   Gap sensor & Black mark   Left
   Without 1/2/3/4/5   :   None

Font
   J   Japanese Font
   F   ASCII

Interface
   S   Serial   USB

Series
   SK1-31   3" model

SK1-21 S J 3 - 1 M Q B

Option

B   Bezel

P   Presenta

2-Dimensions Barcode

Q   Installed

Without Q   Not available

Paper Core Diameter

M : φ17mm

L   φ25.4mm

Without M/L   φ12mm

Paper Width

Without   58.0mm

1   60.0mm

Sensor

Without   Reflection Sensor(Right)

1   Reflection Sensor(Left)

2   Gap Sensor + Reflection Sensor(Right)

3   Gap Sensor + Reflection Sensor(left)

Font

J   Japanese

F   ASCII

Interface

S   Serial   USB

Series

SK1-21   2" model

2 Handling Method

2-1 Options

This Series provides the following parts as options:
(These parts can be purchased through the stores/shops you have purchase, and the details of the optional parts can be inquired to the stores/shops and/or distributors.)

■ Paper Rolls

Make sure to use the paper roll specified as below:

Specifications	P-80-102A
Part No.	TF50KS-E2D
Sensitivity	Standard duration
Paper width	79.5±0.5mm
Thickness	59µm
Roll diameter	Φ102mm
Core	Internal dia. Φ12×External dia.Φ18mm
Thermal paper side	External
Internal paper end	No adhesion No fold
External paper front	Cut straight and put a seal
End mark	A red stripe on one side of the paper Width: 2 to 5mm Length: 500±100mm

■ Cables

Interface Calbe   USB Cable
Power-supply cable
AC Adaptor
AC code

■ Paper Roll Holders

Embedded paper holder (HOLDER 1) is sized φ12mm. The different size of holder is available.

Part No. :   HOLDER 2
Applicable roll holder: φ17mm

Part No. :   HOLDER 3
Applicable roll paper: φ25.4mm

Paper Holder

Head open button

Chassis fixture hole

Status LED

SELECT Switch

FEED Switch

Gap Sensor adjustment screw

Near End Sensor

Power-supply Connector

Serial Connector

USB Connector
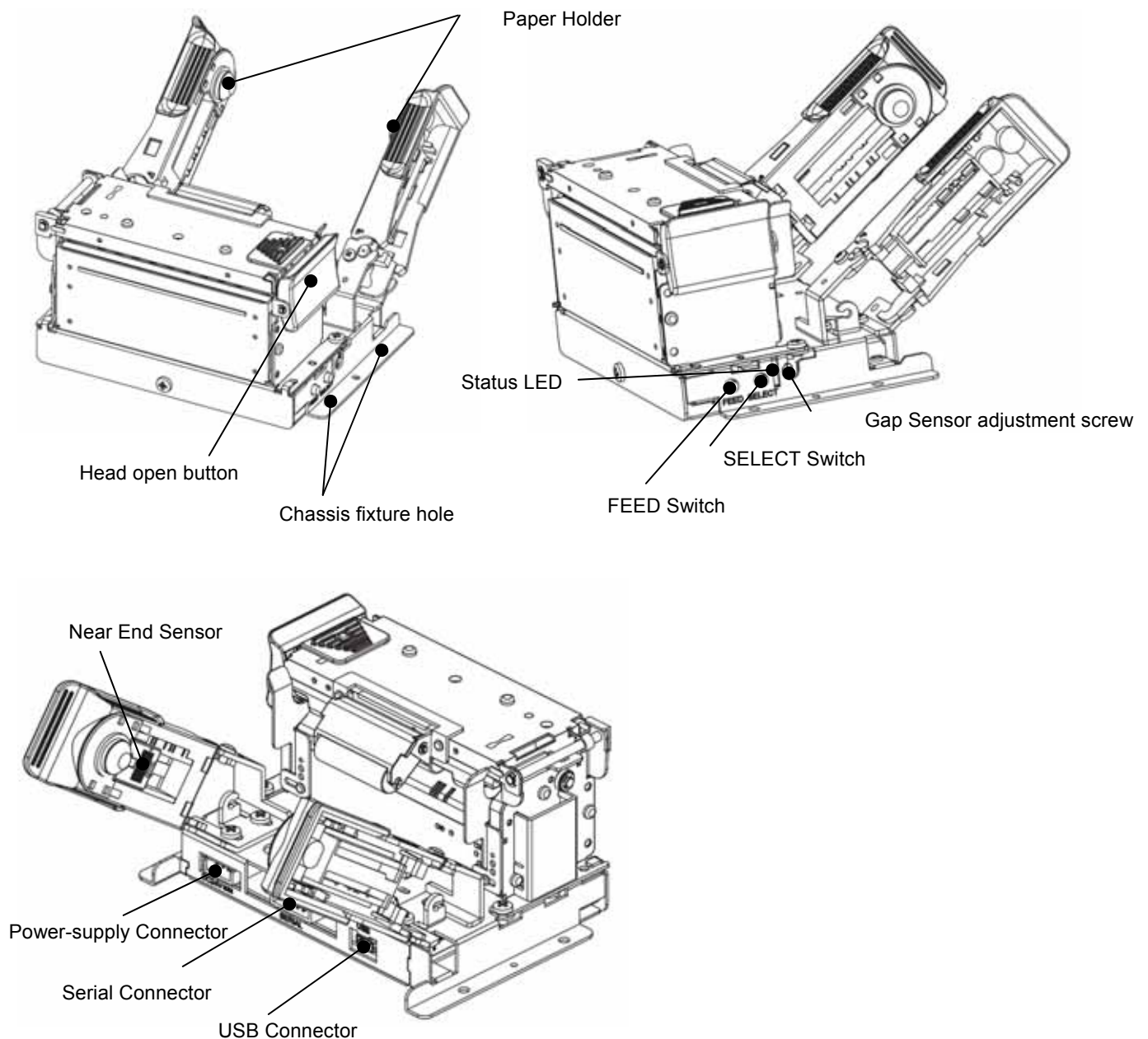
    Paper holder   :   Paper Roll is hooked to the roll paper bar(3 different holders available)
    Head open button   :   Printer head is opened by pushing the button when Paper Roll is set
    Chassis fixture hole   :   To be screwed by uset to the setting place
    Status LED
    FEED Switch
    SELECT Switch
    Gap sensor adjustment screw
    Near end sensor
    Power supply connector :   for DC power supply
    Serial connector   : for Serial
    USB connector   : for USB

2- 3 Status LED

Status LED
LED shows the error status. Please refer to "IV-7 error message".

2- 4 Inside Structures

Paper Eempty Sensor

Print thermal head

Platen roller

Auto cutter
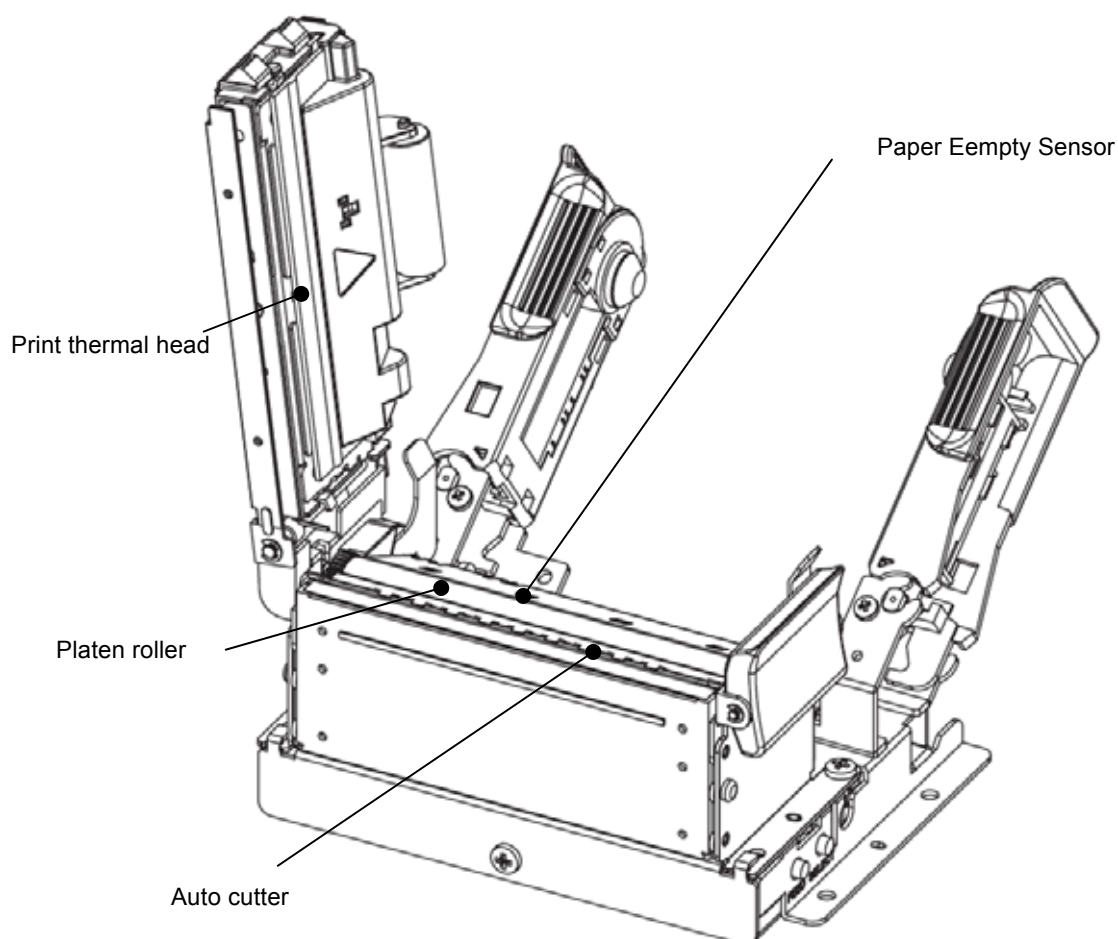
Print thermal head
Prints characters and graphics to thermal papers.

Paper end sensor
Detects paper empty. If the sensor detects paper empty, the printer stops printing.

Platen roller
Feeds the thermal paper on friction with the print head.

Auto cutter
Cuts the thermal paper

1. Use head open button

Press the head open button to lift up the print head.
Install the paper roll as shown in the picture   Printing surface: External (top) side

Set the paper roll

Press the button to open the print head

Close the print head with the roll end emerging beyond the paper exit.
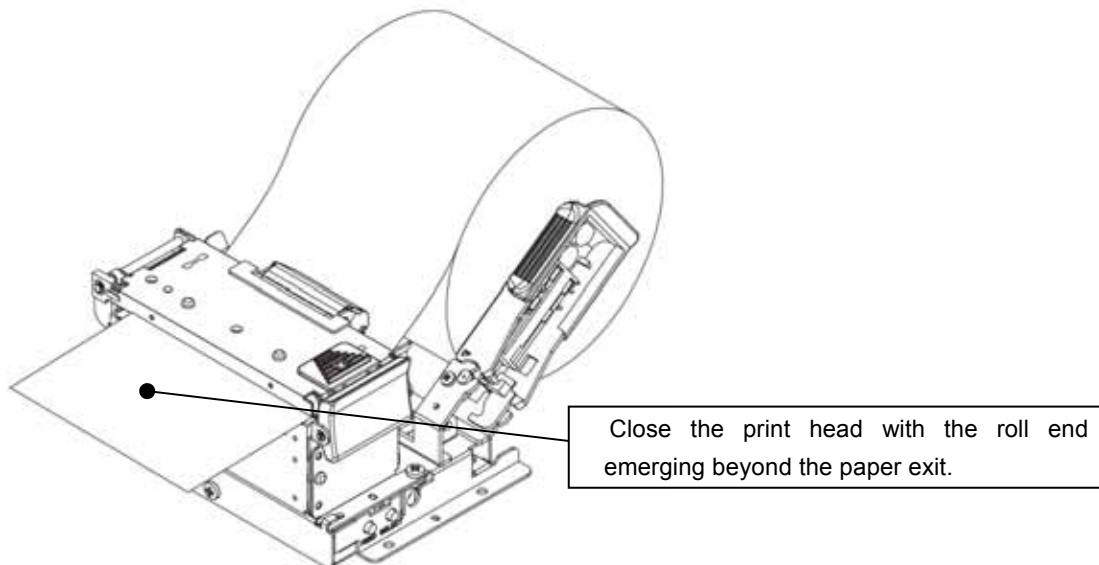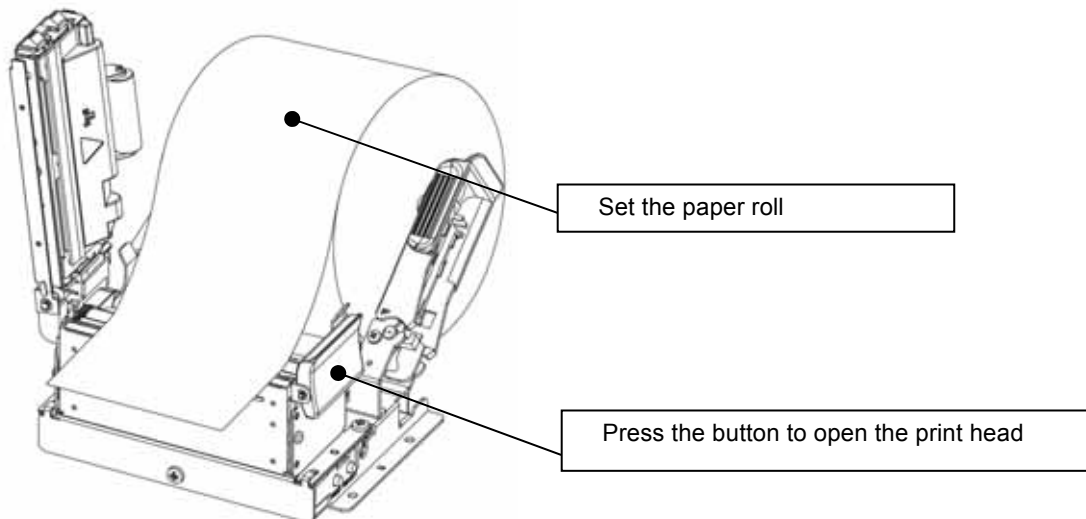
⚠   Handle the auto cutter carefully, so not to injure the finger or hand.
Make sure the print head is completely closed and locked.
If the paper is jammed, follow the same procedures.

2. Auto-loading system

SK1-31 is designed to autoload the paper easily.
　　Install the paper roll to the holder.
　　Insert the roll end toward the print head.

| Set the paper roll |

| Insert the roll end into the print head |
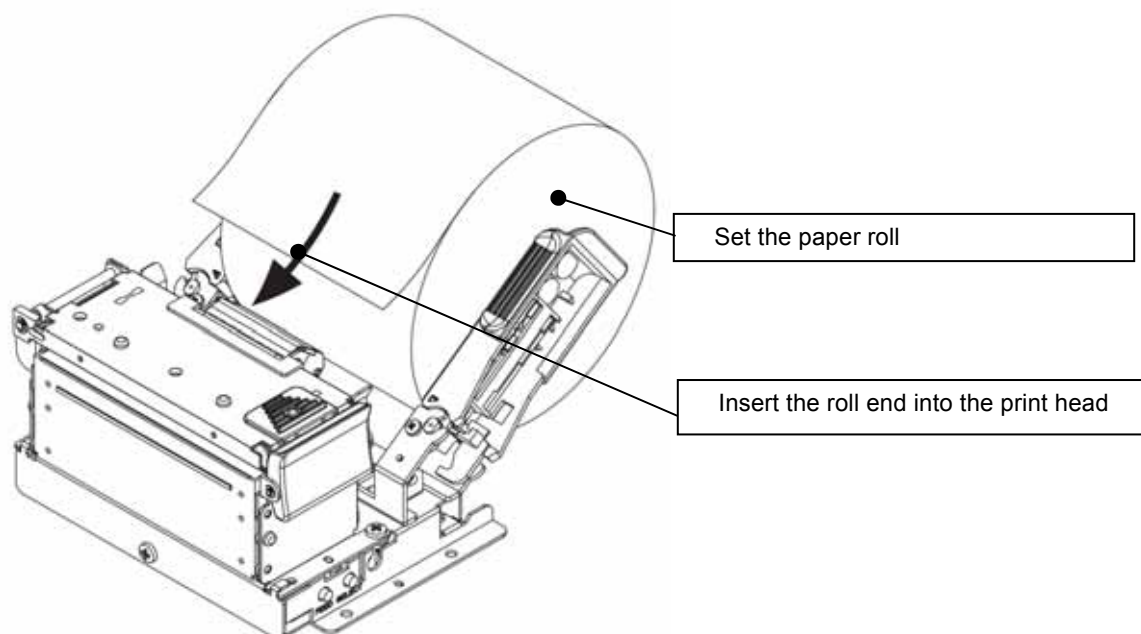
The paper feeds automatically when the paper-empty sensor detects the paper.

| Insert the paper to make the paper empty sensor detect the paper. |
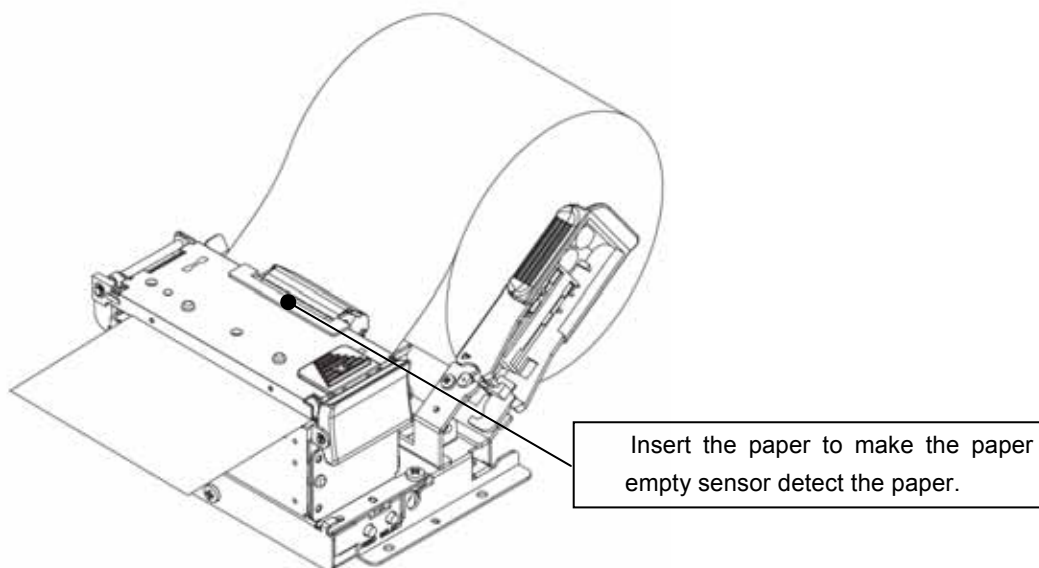
If it is difficult to insert the paper, autoload the paper first, then set the paper roll into the holder.

2- 6   Interface Connector

Connect the interface cable after turning the printer power OFF.
Plug in the interface connector observing the correct orientation.

> ⚠️ Always grip the connector when unplugging the interface cable.
> Place the interface cable to avoid tripping over it.

2- 7   Power ON/OFF

Power ON
Provides power to the power connector.

Power OFF
Disconnects the power through the power connector.

2- 8   Paper near-end sensor

The paper near-end sensor on the paper holder is adjustable for in three positions.
The sensor is positioned along to the paper roll axis at the factory. To adjust and choose a suitable position, slide it up or down.

Paper roll diameter: φ102mm

Near end Sensor

Setting position

When a 102mm roll is installed, do not position the sensor in the circled areas.

Position   1

Position   2

Position   3

Paper roll diameter:φ83mm

Near-end sensor
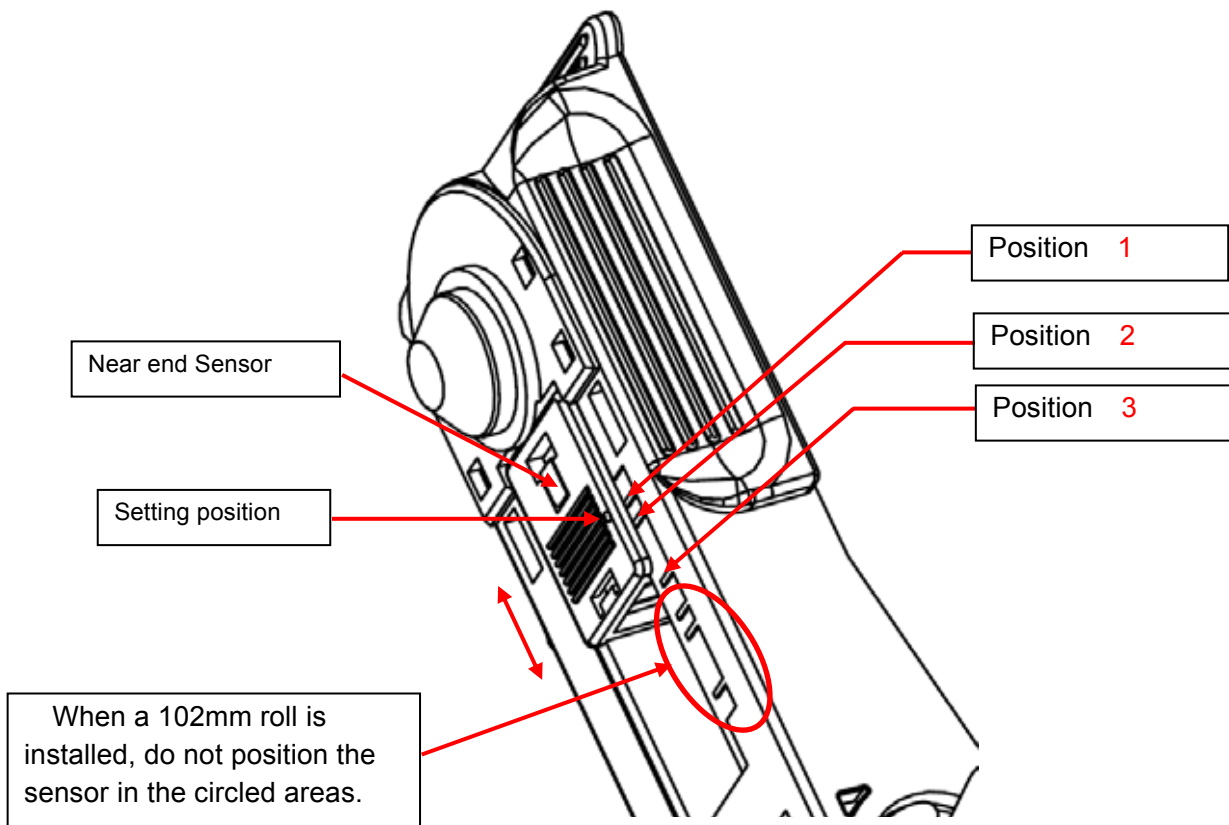
Position 1
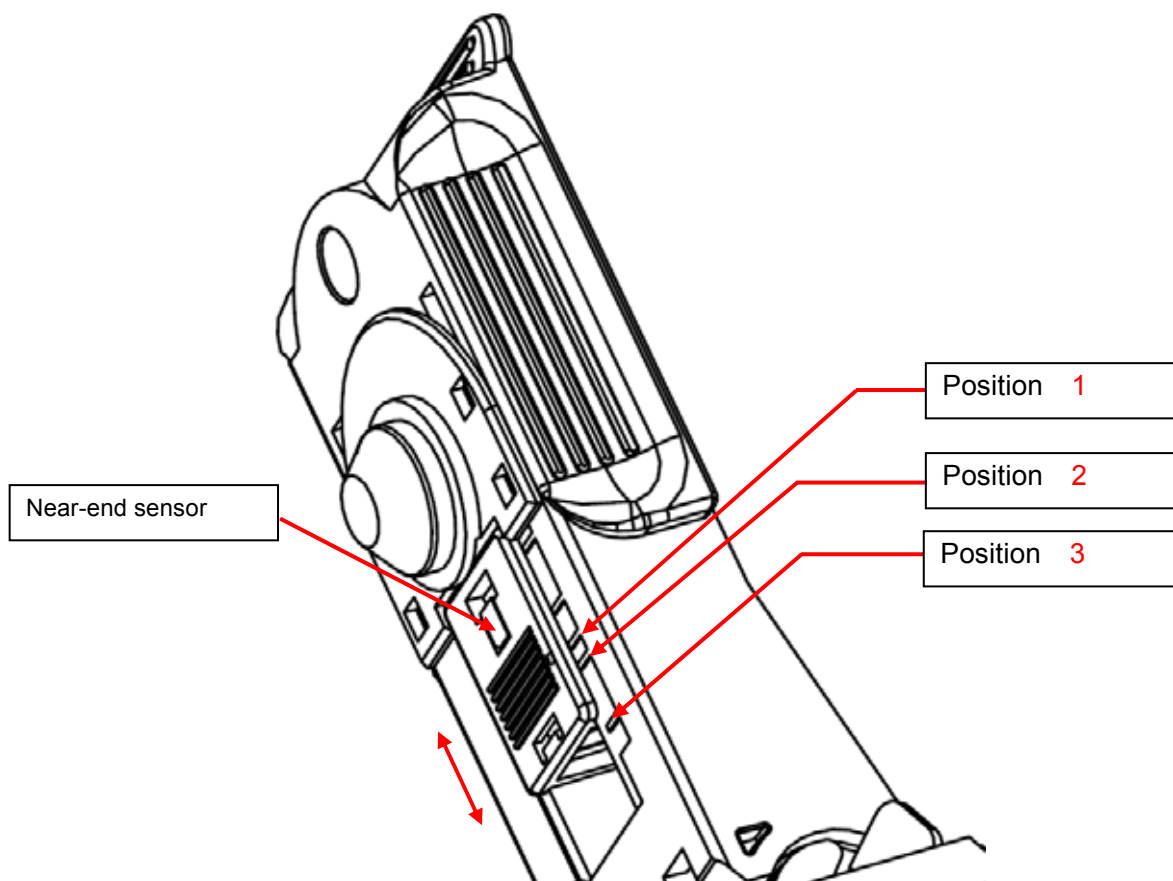
Position 2

Position 3

Position	Detectable paper diameter	Paper core Internal/External
1	φ21.0±2mm	φ12.0/18.0mm
2	φ24.5±2mm	φ17.0/21.0mm
3	φ35.0±2mm	φ25.4/31.4mm

Unit　mm

⚠ Do not mount the printer on vibrating or slanted surfaces.
The amount of paper remaining varies by paper roll.
The external diameter should be used as a reference value.

2- 9   Changing paper holder axis

1. How to change the paper holder axis
   Three different holder axes are available, and are changeable as follows:

Pinch together the nobs located on the reverse of the paper holder.
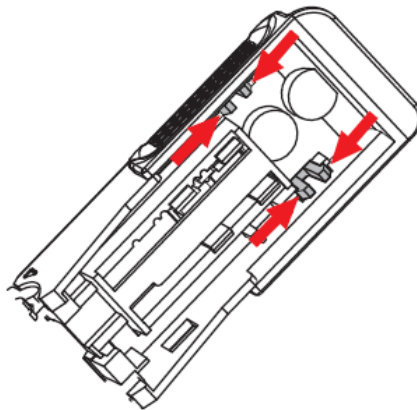
Pull away from the paper original holder axis.
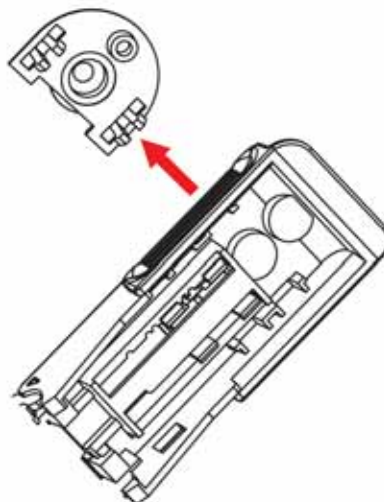
Push on the new holder axis until it clicks into place.
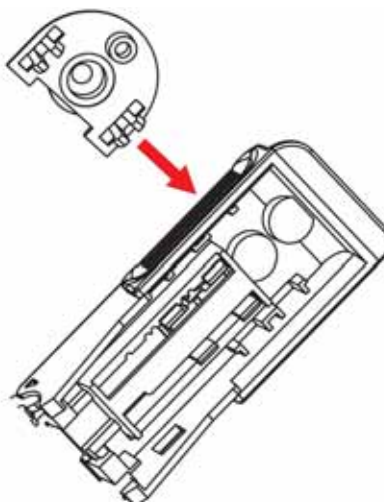
2. Change the position of paper holder axis

The total size of the printer is reduced when the position of paper holder axis is lowered and anφ83mm paper roll is installed. For exact size, please refer to 3-8 dimensions.

Squeeze the nobs for the paper holder axis located on the reverse of the paper holder and pull off the paper holder.
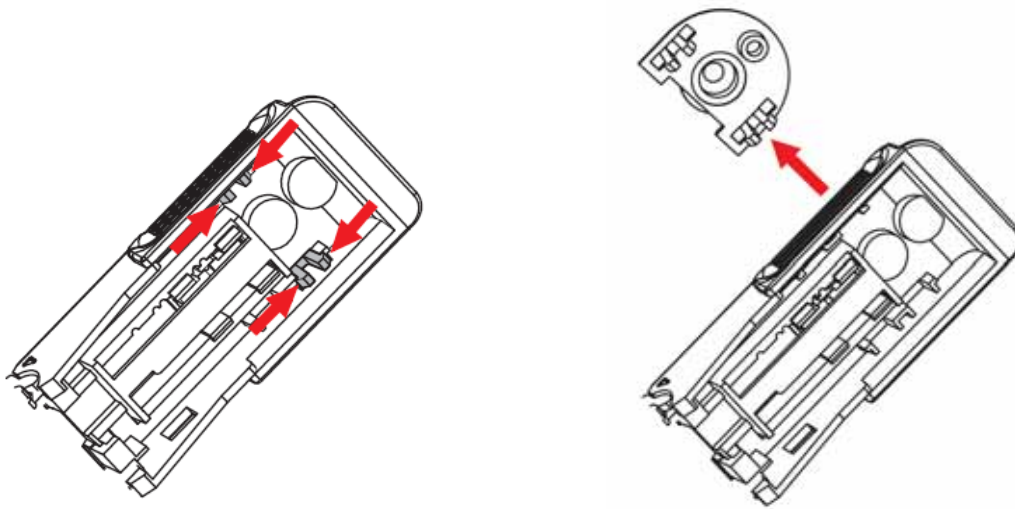
Slide down the paper holder to the new axis and push it until it clicks.

For φ102mm paper roll

For φ83mm paper roll
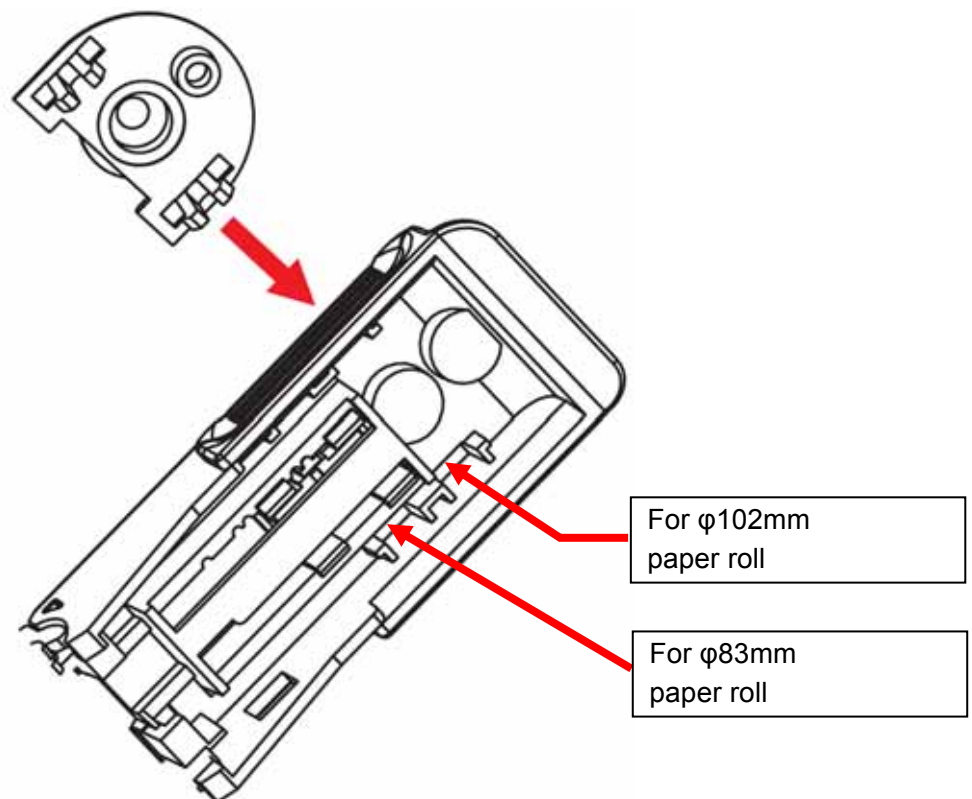
> ⚠ Turn the printer power OFF.
> Don't put fingers into paper exit.

1   First of all, turn OFF the printer power.
2   Press the head open button to lift up the print head.
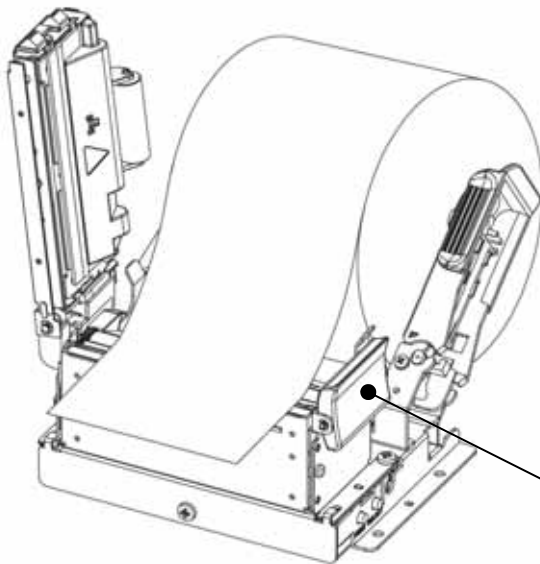
Press the head open button to lift up the print head.

3   Remove the jammed paper.
4   Close the print head and turn ON the power.
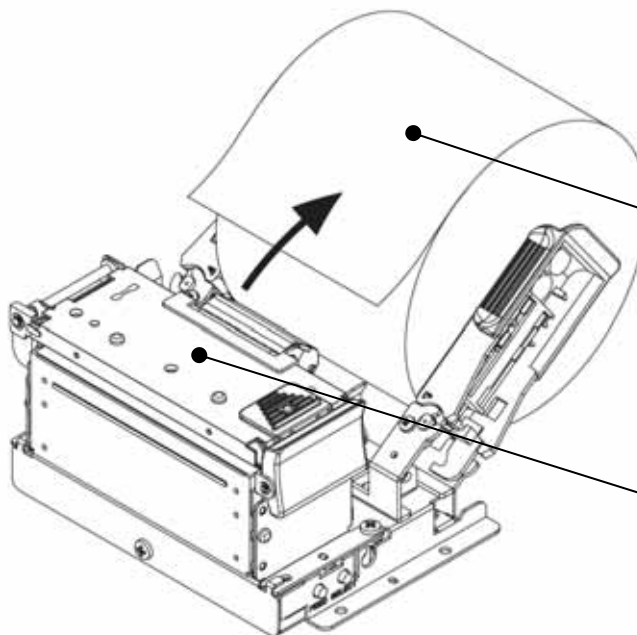
Remove the jammed paper.

Close the print head and turn ON the power.

Bezel has two modes shown as below:
Setting Bezel mode is to refer to the subject on memory switch.

Bezel Mode	Functions
Bezel Mode A/B	In case paper does not feed 60mm when power is on or after auto-cutting, paper feeds automatically until it is fed to 60mm.
Bezel Mode A	Detection by Bezel sensor is transmitted by **ESC v** or **GS a** command. Such as suspension of printing is not done by Bezel sensor detection.
Bezel Mode B	After auto-cutting paper, the next-transmitted data is deleted while paper is in the bezel. Bezel sensor detection is recommended by status command **ESC v , GS R1** or **GS a**.

Bezel Setting
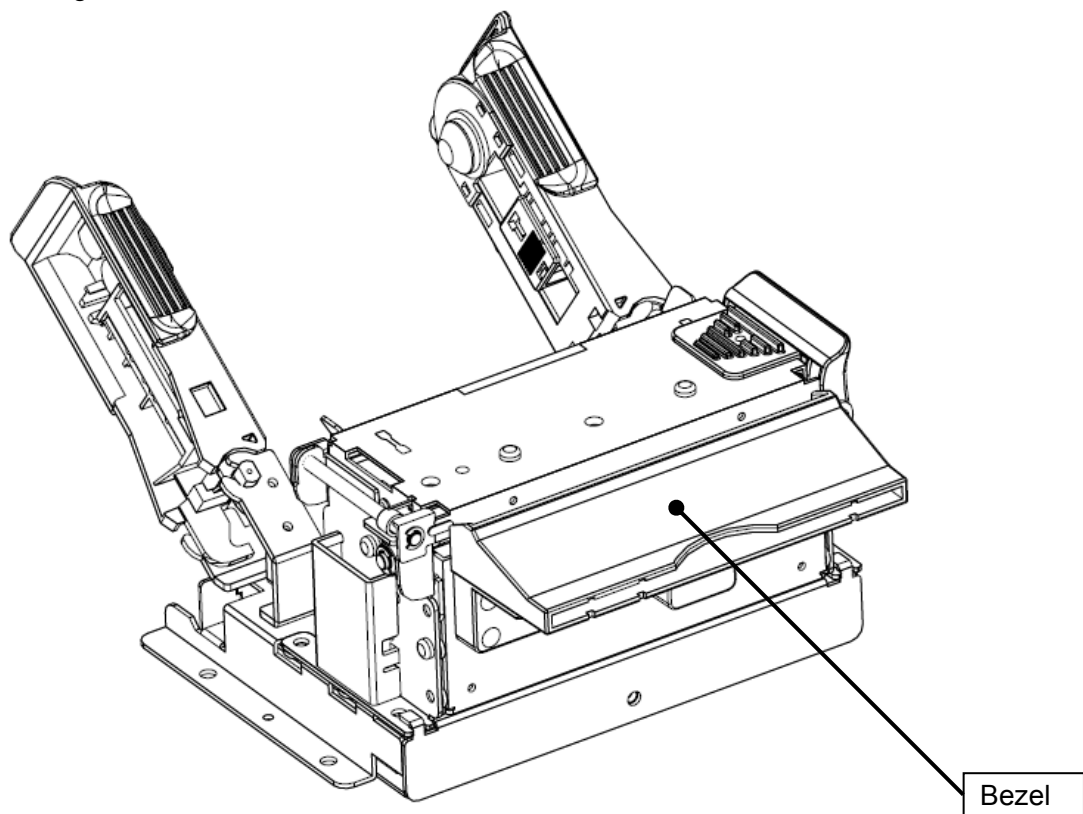
Bezel

⚠ Caution for Bezel sensoring:

1. Bezel sensoring is employed by Reflection sensor.
   Such paper roll printed as being blurred and/or distorted is used, reflection sensor may not be able to detect when black color or the similar on the paper appears at the reflection sensor.

   The position of the reflection sensor is shown below in the illustration.

45

Bezel Reflection Sensor

34

Bezel Reflection Sensor
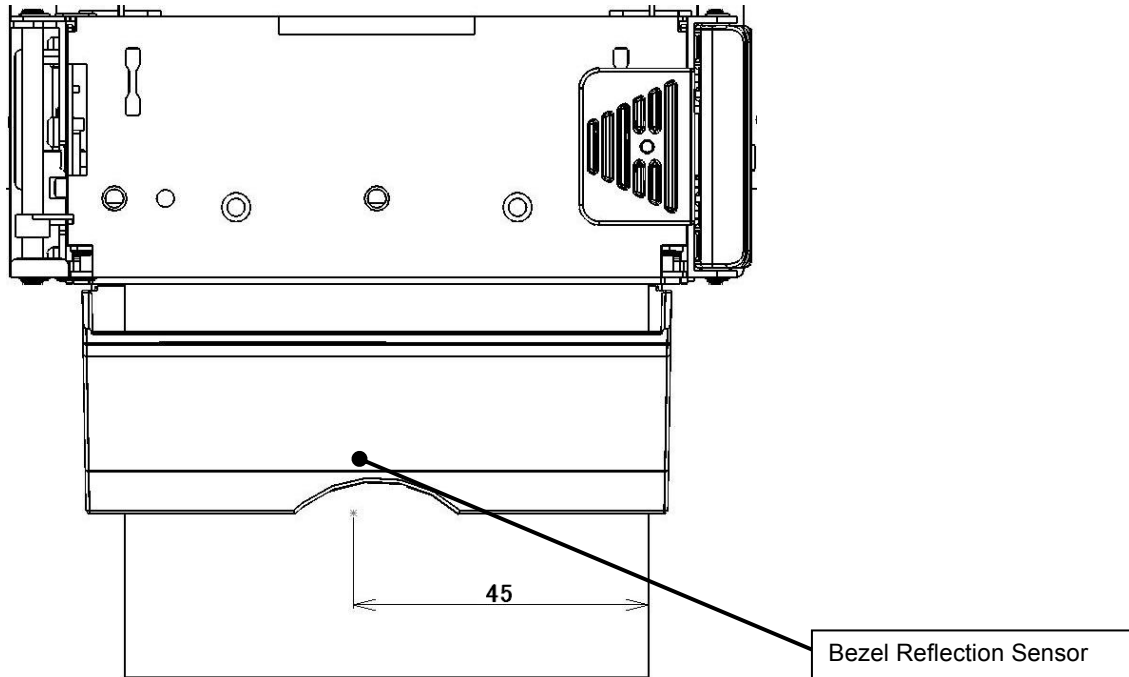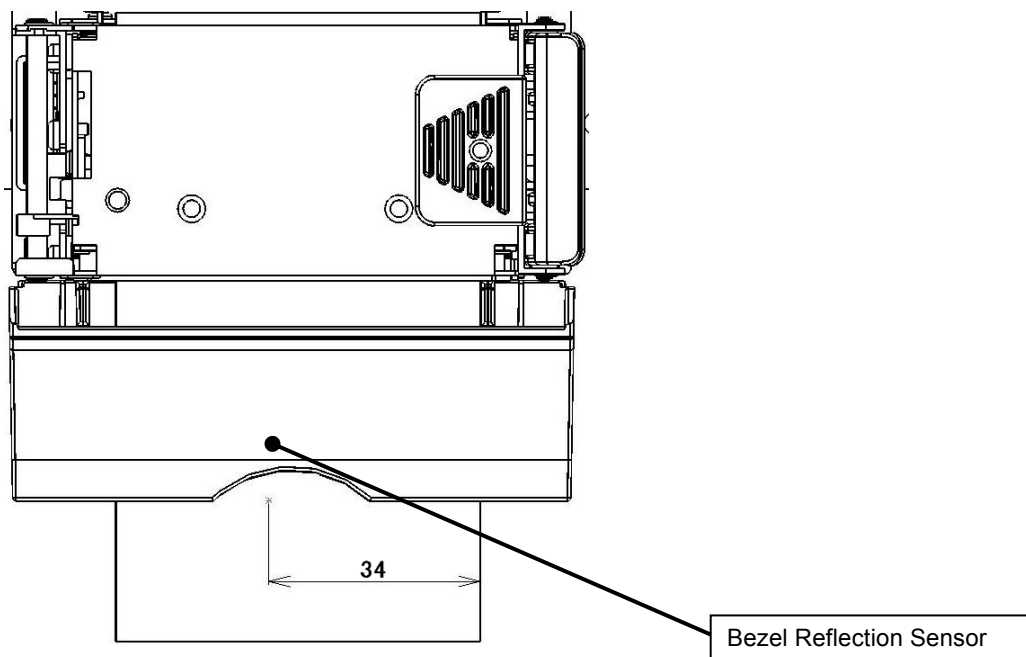
3 General specifications

3-1 Specifications

Model	SK1-31S F	SK1-31S J	SK1-21S F	SK1-21S J
Printing method	Direct line thermal			
Paper width	58/60/80/83mm 1		58/60mm	
Print width	54/56/72/80mm		54/56mm	
Number of dots	432/448/576/640dot		432/448dot	
Resolution	8dot/mm(203dpi)			
Maximum printing speed	Max.200 mm/s *Note 1			
Paper holding method	Paper Holder			
Interface	Serial(Max.115.2kbps), USB2.0			
Charactors	ASC	PC437/850/852/857/858/860/863/865/866,WPC1252 square form of kana (the Japanese syllabary)			
	Japanese Font		JIS X 0208-1990		JIS X 0208-1990
	Download	available			
	User defined	-		-	
Font /Dots/ Lines	Printing Width	Printing Width 54/56/72/80mm			
	ASC 16 dots	8×16 dots(W×H) 54/56/72/80 lines			
	ASC 24 dots	12×24 dots(W×H) 36/37/48/53 lines			
	Jfont 16 dots	16×16 dots(W×H) 27/28/36/40 lines			
	Jfonrt 24 dots	24×24dots(W×H) 18/18/24/26 lines			
Paper Sensors	Near end Sensor/Paper empty Sensor (OPTION) BM(Black mark) Sensor/Gap Senssor		Near end Sensor/Reflection Sensor (OPTION) Gap Sensor		
Memory	Input buffer 8k bytes User memory Non-volatile memory			
Logo registration	Download bit image			
Barcode	UPC-A/E JAN13/8 CODE39 ITF CODABAR CODE128			
2D bar code Option	QR MaxiCode MicroPDF417 PDF417 DataMatrix			
Command systems	ESC/POS compatible *Note 2			
Setting position	Horizontal surface			
Regulation	VCCI, FCC, CE, CLASS A			
Printing life	Pulse activation 200million pulses or more Note3 Abrasion resistance 150Km or more			
Cutter life	Cutting life 1.5 million cuts or more (Thickness 75um or less) T.B.D (Paper thickness 76um or more)			
Power supply	DC Power supply DC 24V±5% / TYP 3A (Peak 7.5A)			
Current consumption	Standby 70mA or less Printing Average 2.5A *Note 3			
Operating environment	Temperature -20 to +60 Humidity 20%RH to 85%RH No condensation Printing quality is guaranteed from+5 to +40			
Storage environment	Temperature -30 to +70 Humidity 10%RH to 90%RH No condensation			

Model	SK1-31S F	SK1-31S J	SK1-21S F	SK1-21S J
Weight	630g Without paper roll		525g Without paper roll	
Dimensions	127×145.5×88.5mm W×D×H without protruding parts		104×145.5×88.5mm(W×D×H without protruding parts)	

Paper roll	Paper width: 58 / 60 / 80 / 83 mm Note 4 & supplement
	Paper thickness 59μm to150μm
	External dimensions φ102mm or less
	Core diameter
	              Internal/External dia. φ12.0mm/18mm
	              Internal/External dia. φ17.0mm/21mm
	              Internal/External dia. φ25.4mm/31.4mm
	
	Standard of print density
	       Part No. Thickness Print density
	       TF50KS-E2D 59μm 1.0
	       TF11KS-ET 145μm 1.2
	       P220AC 105μm 1.1
	       PD160 75μm 1.05
	       HP220A 65μm 1.0
	
	Fan fold
	       The printer prints fan fold paper. For further information, please contact a local dealer.			

*Note1   Use AC adapter, printing rate less than 25%.

*Note2   ESC/POS is registered trademark of Seiko Epson Corporation.

*Note3   DC24.0V, Printing rate 25%, at room temperature

*Note4   Not permitted with the smaller width paper roll.

          Friction between the head and the platen roll in the no paper area may degrade print quality.

(Guaranteed area of acceptable temperature and humidity)
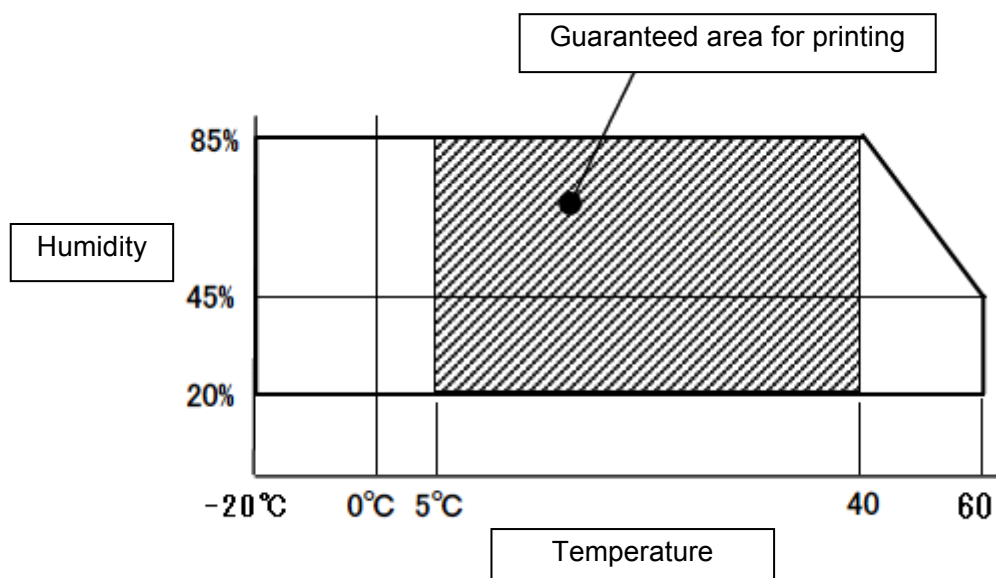
(1) Paper-end sensor

The paper-end sensor is installed into the paper path and the photo-interrupter detects the existence of paper in the printer. When the paper runs out, the red LED lights and the printer goes into error mode and stops in the printing process.
After the paper is replaced, the printer resumes printing.

> ⚠ Once the paper end sensor sends the paper empty signal, the printer stops printing.
> As soon as the paper end strip appears, replace the paper roll.

(2) Head open sensor

The head open sensor detects whether the print head is open or closed. Once the sensor detects the head open signal, the printer stops printing and goes OFF-Line, the Error LED lights Red. The printer resumes printing after the head is closed.

(3) Thermistor

The thermistor built in the print head detects the temperature of the print head.
If printing at a high printing rate for a long time, the print head temperature rises and the head may become overheated. To prevent overheating, the printer stops printing when the temperature is beyond a certain level, and blinks the red Error LED.
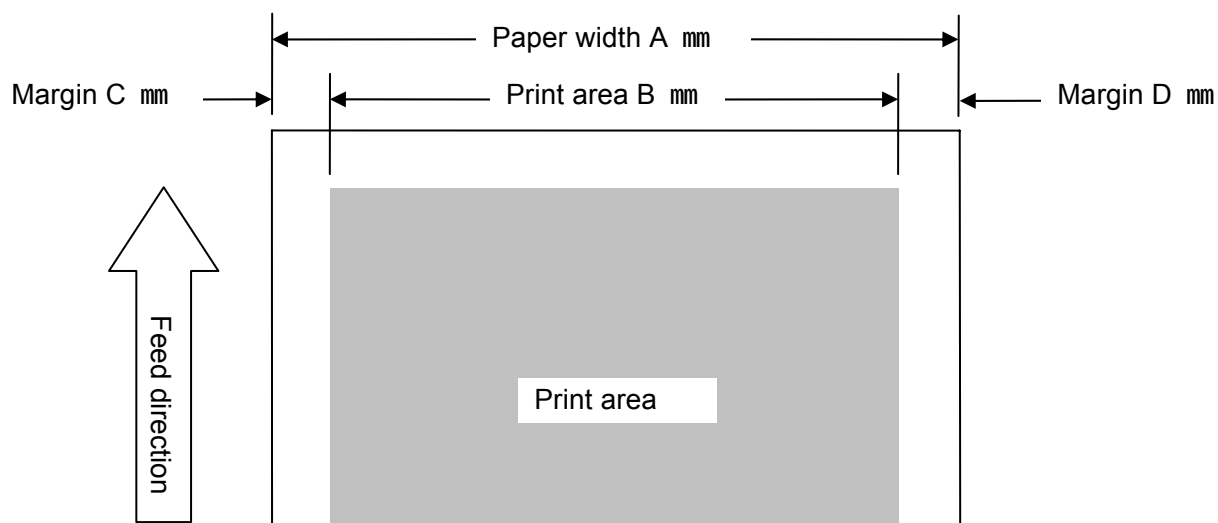
Printing area

Paper width/Printing width	A	B	C	D
58mm /54mm	58	54	2	2
60mm / 56mm	60	56	2	2
80mm / 72mm	80	72	4	4
83mm / 80mm	83	80	0	3

⚠ The left and right margins are approximate distance from paper edge and will shift about ±1mm depending on the paper path, paper position and tolerances.

3- 4   Print head and cutter position

Print head and cutter position

Cutting position

Paper feed

Limited length for feedback

Approx.7.0m

Approx.8.6mm

Thermal dot lines
on the print head
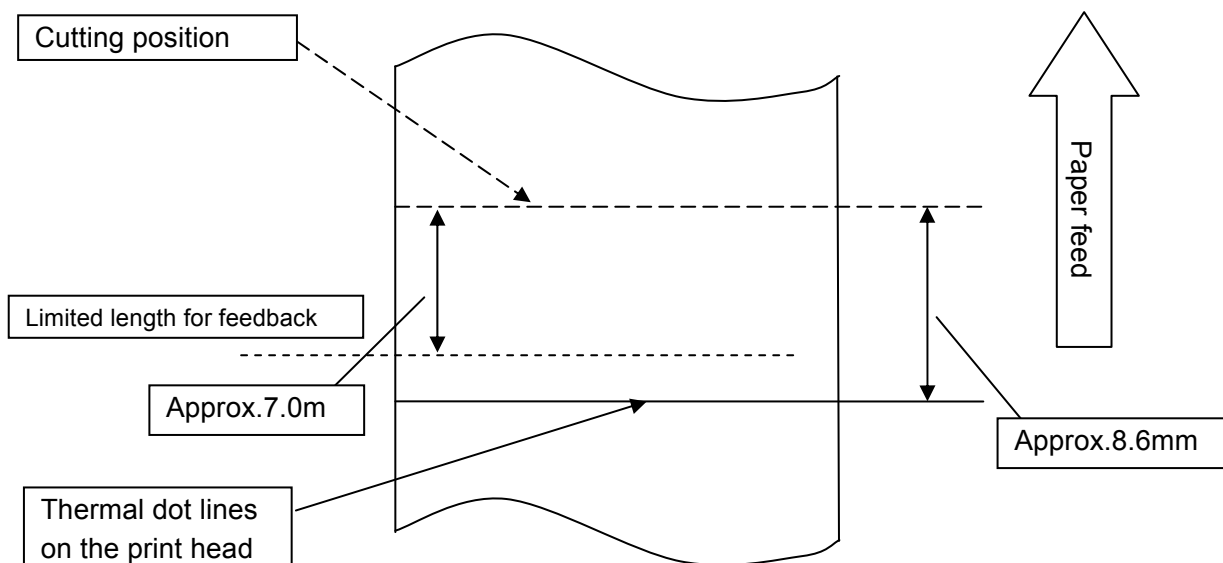
| ⚠ | The numeric values in the figure are nominal center values. Leave enough margin for the cutting position to account for paper flex or variability. The position of partial cut is varied by paper width. Partial cut is designed to keep the paper at the center of 80mm paper. |

3-5 Paper sensor position

SK1-31

Paper edge / Paper feed / Thermal dot line / Approx.13.5m / Black mark (L) / Gap sensor / Paper empty / Black mark(R)
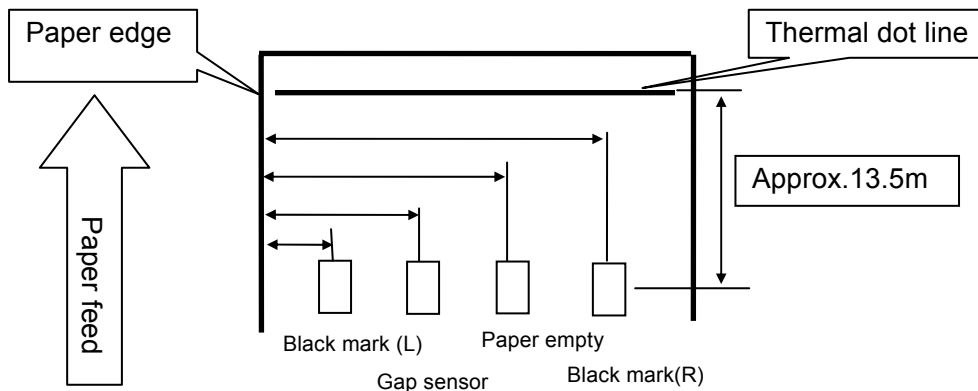
Sensor		Distance from paper edge ±1.0mm
Black mark Left	Note1,2,3	7.3mm
Gap sensor Note1		29.0mm
Paper empty		50.2mm
Black mark Right	Note 1,2,3	72.0mm

Note1: Black mark sensor and gap sensor are embedded in the factory as options.

Note2: Choose the position of Black mark sensor either (L) or (R).

Note3: Black mark on reverse of thermal paper is sensed.

SK1-21

Paper edge / Paper feed / Thermal dot line / Approx.13.5m / Reflection sensor / Gap sensor / Reflection Sensor
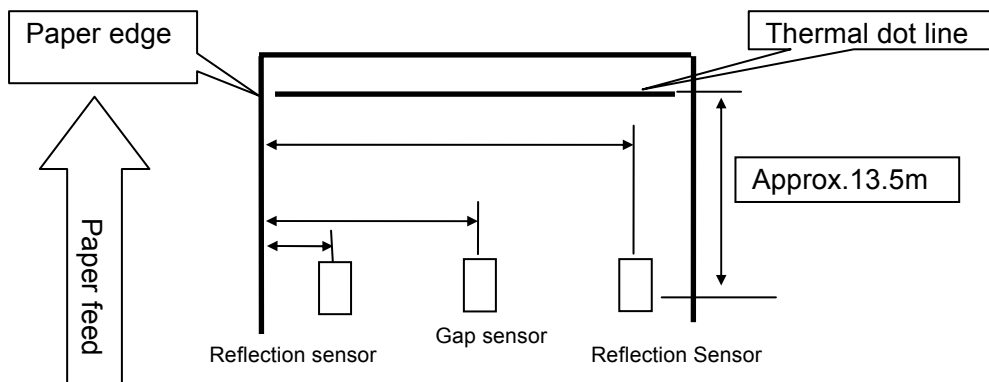
Sensor	Distance from paper edge ±1.0mm
Reflection sensor (Right)	54. 2mm
Gap sensor	19. 3mm
Reflection sensor Left	4. 2mm

Note1: Black mark sensor and gap sensor are embedded in the factory as options.

Note2: Black mark on reverse of thermal paper is sensored.

(1   Avoid deterioration by backlash feeding

Backlash in the paper feed mechanism may lead to under feeding and crowding of characters on adjacent lines. Be sure to always turn the paper feed motor 24I steps   3mm   at the start printing and initialization, and after opening and closing the thermal head.

 2   Notice on graphic printing

If the printer must wait for data from host systems while printing, it will temporarily stop printing and feeding paper. After the printer receives new data and resumes printing, the paper feeding of 1 to 3 lines may become irregular, especially if it is printing a bit image. In graphic printing, you may see irregular printing if the single lines of data are specified for Raster bit images. Specify a minimum of 16 lines or more when graphic data is printed.

(3)   About paper cut
To prevent the printer from paper jam, the printer automatically feeds the paper about 1mm after cutting process. Therefore printing position is added 1mm to cutting position

3-7 Dimensions

External dimensions　Unit　mm
SK1-31
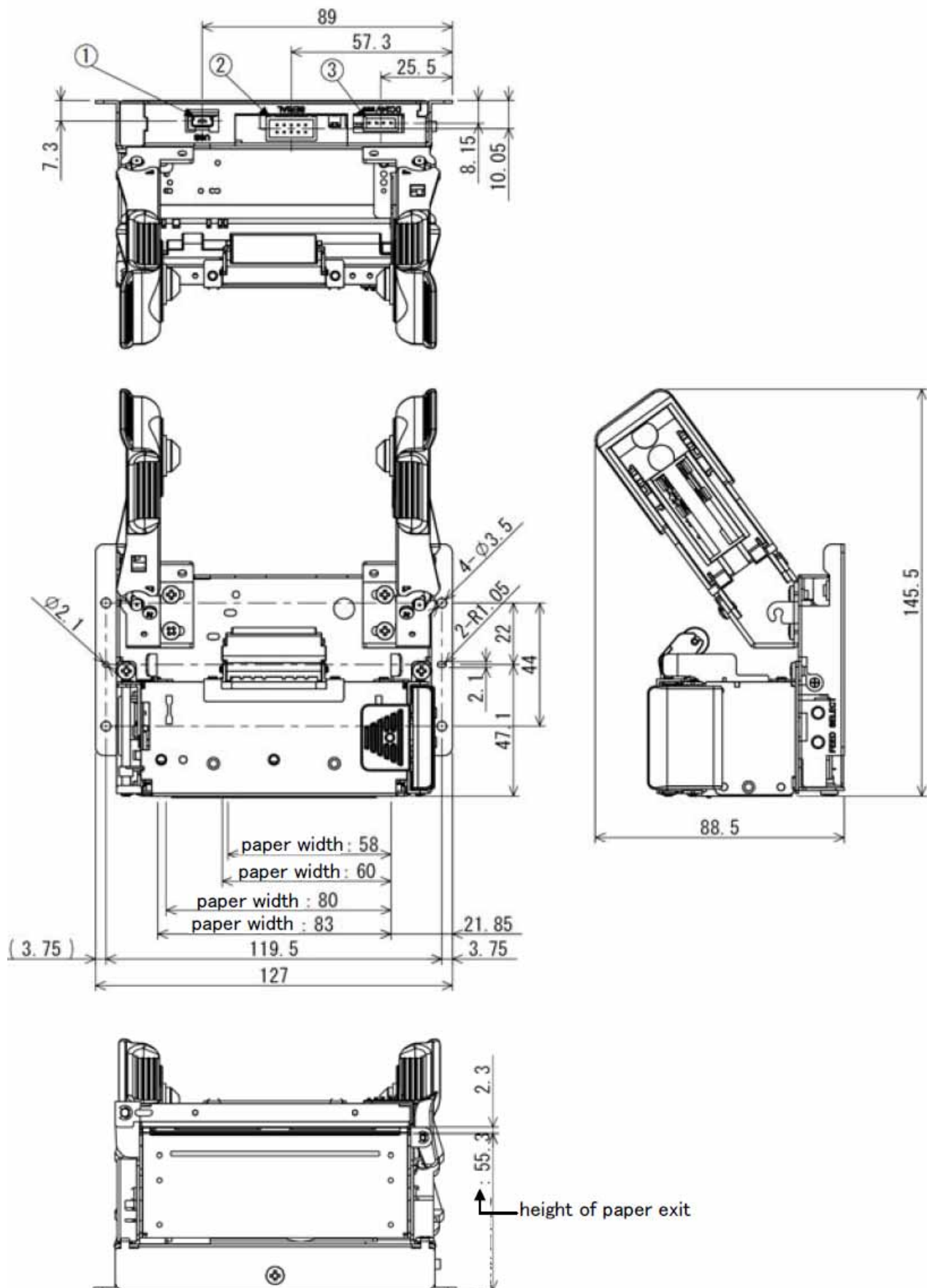
Paper roll axis (Roll diameter φ102mm)
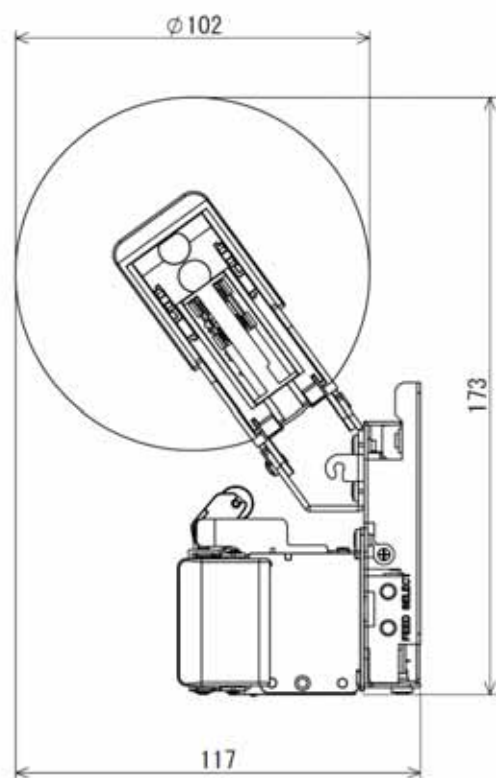
Unit   mm

Paper roll axis (Roll diameter φ83mm)

Unit   mm

SK1-21

paper width

58

60

(3.75)

96. 5

104

21. 85

3. 75

Ø2. 1

2-R1. 05

height of paper exit

88. 5

145. 5

Paper roll axis (Roll diameter φ102mm)

SK1-21

$\phi 102$

173

117

SK1-31

$\phi 102$

173

117

Paper roll axis (Roll diameter φ83mm)

SK1-21

$\phi 83$

155

102

SK1-31

$\phi 83$

155

102
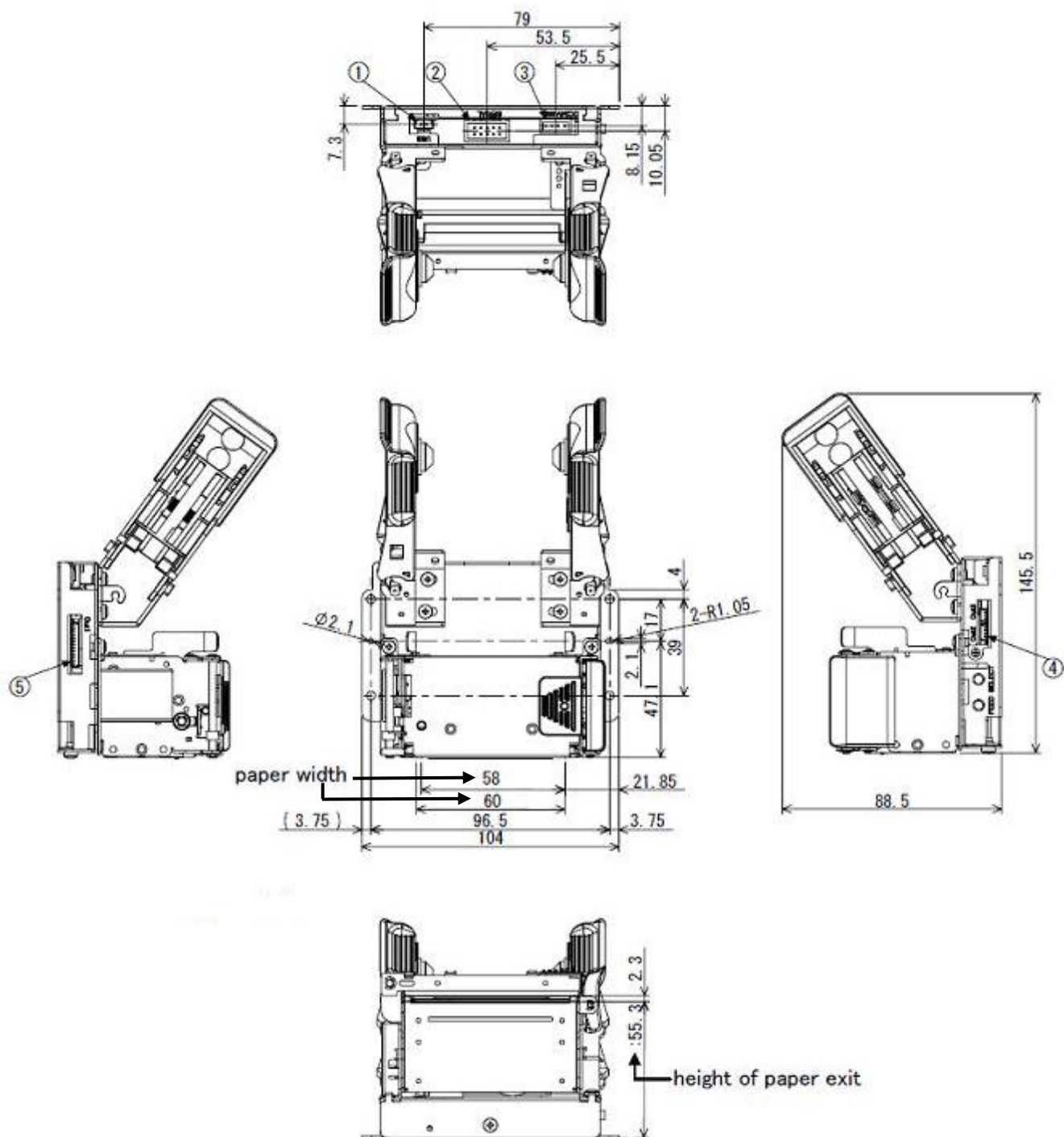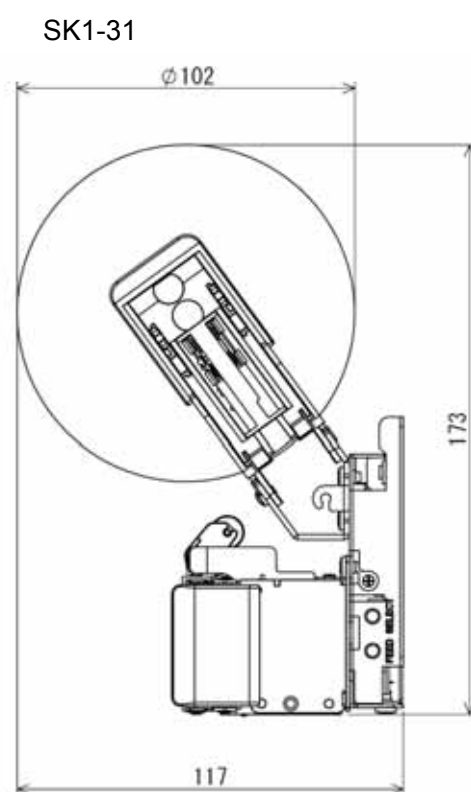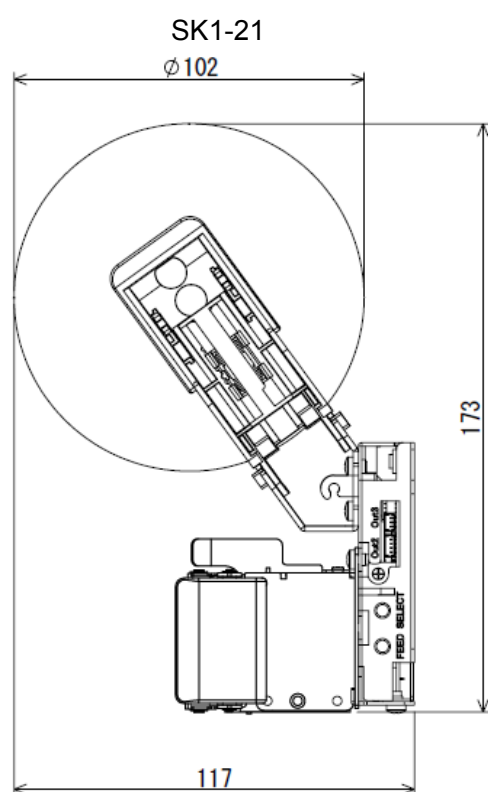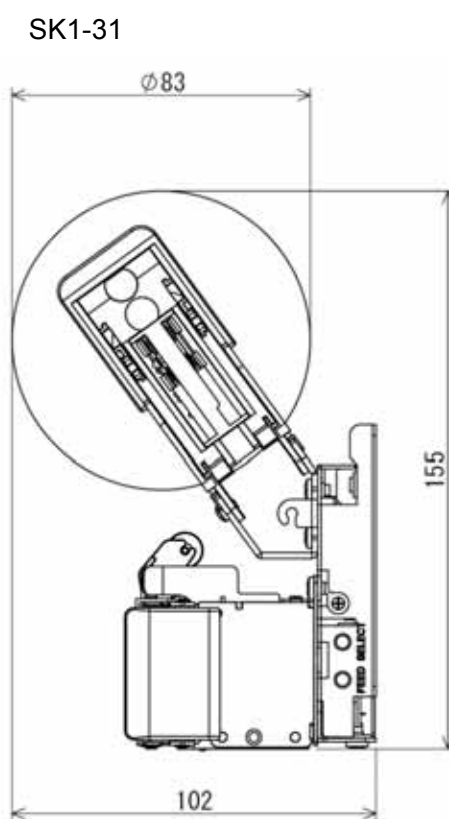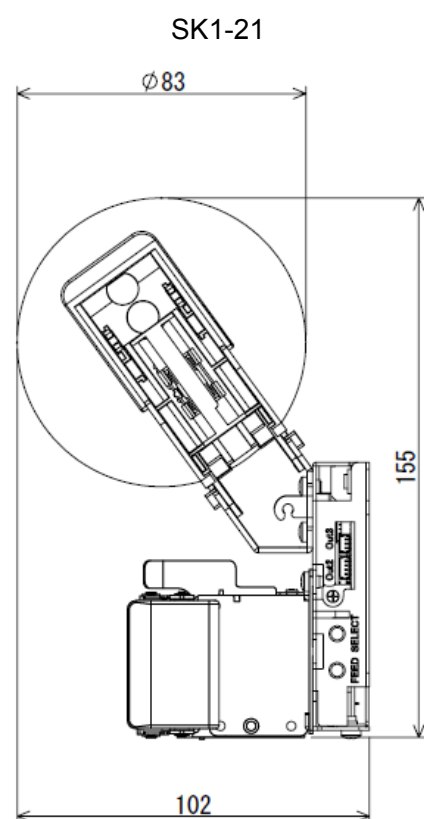
4　Functions

4- 1　Self test printing

The printer prints characters and barcodes at self test printing.

Printing method

Turn ON the power switch while pressing the FEED switch.
When the LED lights up and the printer starts printing, release the FEED button.
After completing the self test printing, the printer goes to Standby mode.

[Printing samples]

SK1-31S (AQ)
Ver 1.00

TEST PRINT

Data entered from the computer is printed in hexadecimal numbers and characters.

Printing method

With pressing the SELECT button, turn on the power switch.
When the LED lights up and printer starts printing, release the SELECT button.
After printing the following "HEX DUMP MODE", starts Hexadecimal mode.
Prints hexadecimal numbers and characters entered from the host system.
Press the power switch to cancel the HEX dump mode.

Example

```
[ HEX DUMP MODE ]


20 21 22 23 24 25 26 27   !"#$%&'
28 29 2A 2B 2C 2D 2E 2F   ()*+,-./
30 31 32 33 34 35 36 37   01234567
38 39 3A 3B 3C 3D 3E 3F   89:;<=>?
40 41 42 43 44 45 46 47   @ABCDEFG
48 49 4A 4B 4C 4D 4E 4F   HIJKLMNO
50 51 52 53 54 55 56 57   PQRSTUVW
58 59 5A 5B 5C 5D 5E 5F   XYZ[¥]^_
60 61 62 63 64 65 66 67   `abcdefg
68 69 6A 6B 6C 6D 6E 6F   hijklmno
70 71 72 73 74 75 76 77   pqrstuvw
78 79 7A 7B 7C 7D 7E 7F   xyz{|}~.
```

4-3 Function setting mode

There is a function setting mode to switch register functions in the memory manually. Functions are called up by the SELECT and FEED buttons and the printer prints registered functions.

(1) About memory switching
The memory switch is classified as follows.

COMMON SETTING	Common functions
INTERFACE SETTING	Basic interface functions

(2) Function setting method
1. While pressing the FEED/SELECT button, turn ON the power switch.
2. When the LED lights up and printing starts, release the button.
3. The printer prints out the current setting mode and returns to that function setting.
4. To change the current function setting, press the feed button.
5. Refer to setting flow chart in "Setting of memory switch."

```
---COMMON SETTING---
PAPER FEED          = OFF
OFFLINE BUSY        = ON
SELECT SENSOR       = Reflection
MARK DETECTION      = OFF
MARK RE-DETECTION   = OFF          ◄──── Common functions
CHARACTER TABLE     = PC437
PRINT DENSITY       = 100%
PRINT WIDTH         = 80/72
PRINT SPEED         = 200mm/s
CUT AFTER FEED-SW   = NON-CUT
USB DEVICE CLASS    = PRINTER
COMMAND MODE        = MODE-A
BEZEL MODE          = NON
```

```
---INTERFACE SETTING---
BAUD RATE           = 115200bps
BIT LENGTH          = 8Bit          ◄──── Basic interface functions
PARITY              = Non
BUSY CONTROL        = RTS/CTS
```

```
---MEMORY SWITCH---                 ◄──── Current memory switch by HEX mode
0x00 0x20 0x00 0x03 0x1E 0x00            (Lead from DC2K command)
```

```
---CURRENT VOLTAGE---               ◄──── Current supply voltage
24.0V
```

```
---SENSOR---                        ◄──── Mark sensor detection level
Reflection          = 0.8V               Threshold voltage
Transmission        = 0.8V
```

Table 2 Example

4-4 Setting the memory switch

Follow the flow chart to change the parameter. As the setting parameter is printed, choose the right parameter by manipulating the FEED and SELECT buttons.
After completing the parameters set up, data are stored and the printer goes to standby mode.

```
┌─────────────────────────────────────────────┐
│ YES : FEED button    ------   Decide         │
│ NO   : SELECT button  ------ Move to next     │
└─────────────────────────────────────────────┘

              ┌───────────────────────┐
              │  Function setting mode │
              └───────────────────────┘
                         │
                         ▼
                 ╱─────────────╲            NO
                ⟨ ENTER SETTING ? ⟩ ┈┈┈┈┈┈┈┈┈┈┐
                 ╲─────────────╱              ┊
                         │ YES                ┊
                         ▼                    ┊
                 ╱──────────────╲      NO     ┊
                ⟨ ENTER COMMON    ⟩ ┈┈┈┈┈┈┈┈┈┈┤
                ⟨ SETTING ?       ⟩           ┊
                 ╲──────────────╱             ┊
                         │ YES                ┊
                         ▼                    ┊
              ┌───────────────────────┐       ┊
              │ Change the setting of  │       ┊
              │ COMMON FEED            │       ┊
              └───────────────────────┘       ┊
                         │                    ┊
                         ▼                    ┊
                 ╱──────────────╲             ┊
                ⟨ ENTER INTERFACE ⟩ ┈┈┈┈┈┈┈┈┈┈┤
                ⟨ SETTING ?       ⟩           ┊
                 ╲──────────────╱             ┊
                         │ YES                ┊
                         ▼                    ┊
              ┌───────────────────────┐       ┊
              │ Change the setting of  │       ┊
              │ INTERFACE             │       ┊
              │   BAUD RATE           │       ┊
              │   BIT LENGTH          │       ┊
              │     :                 │       ┊
              │     :                 │       ┊
              └───────────────────────┘       ┊
                         │ YES ┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┘
                         ▼
              ┌───────────────────────┐
              │    MODE END           │
              │    (Finish)           │
              └───────────────────────┘
```

Prints the below after completing the setting:
SETTING COMPLETE
SETTING MODE END.
The setting mode is finished and the printer goes to standby mode.
Modified data are stored automatically.

4-5 Memory switch setting menue

1 **COMMON SETTING**

Menu	Default	Value	Description

PAPER FEED	OFF	OFF
		ON(10mm)
		ON(20mm)
		ON(30mm)
			Enables/disables paper feed after closing the print head.
			  When paper feed is ON, print feed amount.
			    Cut the paper after feeding the paper
			  The value is changeable using the DC2K command.

OFFLINE BUSY	ON	ON
		OFF
			Enables/disables OFFLINE when the error occurs.
			  At selecting ON
			  OFFLINE is enabled when an error occurs. The printer stops
			 printing and holds received data until the error is cleared.
			  At selecting OFF
			  ONLINE is enabled when error occurs. Receiving data
			  Is continuously processed and printing data is not stored.
			  Setting the command and status response are enabled.

SELECT SENSOR	Reflection	Reflection
		Transmission
			Selects the mark sensor for label printing.
			  Reflection Detect by Black mark sensor
			  Transmission Detect by Gap sensor.

MARK DETECTION	OFF	OFF ON	Enables/disables the Black mark sensor/Gap sensor functions. Enables Black mark and Gap sensor models.
MARK RE-DETECTING	OFF	OFF ON	Enables/disables re-detecting function when the power is turned ON.
CHARACTER TABLE	PC437	KATAKANA PC437 / PC850 PC852 / PC857 PC858 / PC863 PC865 / PC866 WPC1252 / PC860	Selects the characters.
PRINT DENSITY	100%	80% 90% 100% 110% 120% 130% 140% 150%	Specifies the printing density.
PRINT WIDTH	Comply with classified paper width	80/72 60/56 58/54 83/80	Selects the paper width. (Printing width is set at the factory)

Menu	Default	Value	Description
MECHANISM SPPED	200mm/s	110mm/s 130mm/s 150mm/s 170mm/s 190mm/s 200mm/s	Selects maximum speed

SELLECT
 	
NEAR-END
	ON	ON
		OFF
			Selects Near end sensor
			  ON activate sensor
			  OFF cancel sensor

CUT AFTER FEED SW	NON-CUT	NON-CUT PARTIAL-CUT FULL-CUT	Selects cutting operation after FEED switch is on. * function added after V1.20
USB DEVICE CLASS	PRINTER	PRINTER COMMUNICATION	Selects device operation modeUSB * function added after V1.20
COMMAND MODE	MODE-A	MODE-A MODE-B	Selects command emmuation * function added after V1.20
BEZEL MODE	NON	NON MODE-A MODE-B	Selects bezel mode * function added after V1.30

(2 **INTERFACE SETTING**

Menu	Default	Value	Description
BAUD RATE	115200bps	1200bps 2400bps 4800bps 9600bps 19200bps 38400bps 57600bps 115200bps	Selects the baud rate.
BIT LENGTH	8bit	8bit 7bit	Selects the bit length of serial communication.
PARITY	Non	Non Odd Even	Selects the parity of serial communication.
BUSY CONTROL	RTS/CTS	RTS / CTS Xon / Xoff	Selects the flow control of serial communication.

4-6 Adjusting printing density

Paper sensitivity varies by type of thermal paper. Choose the right density to realize best printing quality and reliable printing. (The excess heating of the thermal head may cause the reduction of head life and contamination)
Allows setting density form 50 to 200 . The default value from the factory is 100% for maintaining proper printing quality. Details of the adjustment method are written in " Command systems **DC2** (Set print density).

Printing density

Part No.	Maker.	Density
TF50KS-E2D	Nippon Paper	100
TF50KS-EY	Nippon Paper	100
TF11KS-ET	Nippon Paper	120
F230AA	Mitsubishi	100
HP-220A	Mitsubishi	100

4- 7   LED display

When an error occurs, the STATUS LED lights or blinks depending on the type of errors as follows.

1.   No error signal is detected.

   Standby
   It is possible to print and the printer waits for printing data by ONLINE.
   Initialization
   Initialize printer memories. The printer goes OFFLINE during initialization and
   status LED blinks. After completing initialization, the printer goes standby.

2. Auto-recovery error

   Temperature error
   The print head temperature is increased when heavy-duty printing is continuous. If the print
   head temperature exceeds70 degrees C, operation of the print head is automatically
   stopped to prevent overheating. The status LED blinks and the printer goes OFFLINE.
   The printer resumes printing when the head temperature falls to 60 degrees C or lower.

   Paper empty
   Detects the paper empty through near end sensor and paper empty sensor.
   The status LED blinks at paper near end and keeps the printer ONLINE.
   After the paper runs out and the printer detects paper empty, the status LED turns On
   and the printer goes OFFLINE.

   Print head open
   When the print head is lifted up, the status LED turns ON and the printer goes OFF-LINE.
   After closing the print head, the printer goes on standby.

3. Unrecoverable error

   Auto cutter lock
   When the cutter is blocked by a paper jam, the status LED blinks.
   Press the head open button to return the cutter to its home position.
   If the cutter does not return, keep the print head closed and contact a local dealer.

   Voltage error
   When the printer detects abnormal voltage, the printer blinks the LED and goes OFFLINE.
   Check the power supply voltage and if the problem is not cleared, please contact a local dealer.

4. LED status
LED status   / : Turn ON red and green for 0.1sec   : Turn OFF for 0.1sec

No error signal is detected

Status	LED
Standby	ON (Green LED)
Initializing	(Green LED)

Auto-recovery error

Status	LED
Temperature error(70 or more)	(Red LED)
Detect near end	(Green LED)
Paper empty	ON (Red LED)
Print head open	ON (Red LED)

Unrecoverable error

Status	LED
Auto cutter lock	(Red and Green LED)
Upper limit voltage error (27.0V or higher	(Red and green LED)
Lower limit voltage error (18.0V orlower)	(Red and green LED)

4- 8   Memory

1   Structure of memory

Table1. Capacity

No	Memory	Size(Unit: Byte)
1	Input buffer	8192
2	User memory	8192
3	2D barcode Option	34480

2   Input buffer
Buffer memory stores input data from the interface.

3   User memory
User memory is used to store external characters, download characters and bit images.
Users are able to manipulate the area freely. Calculate the available memory size due to
the limited amount of memory available.
If there is no available memory, erase the used memory to free up enough space.

4   2D barcode (option)
2D barcode printing is available as an option.
The 2D barcode is manipulated for editing and analysis of data within the assigned area.
For detailed information, refer to **GS Q** command.

5 Interfaces

(1) Pin layout

Connector: Mini-B type 5-PIN

This printer is equipped with USB version 2.0 for high speed data transfer.
The device class is "Printing Device."

Pin	Signal	Direction	Function
1	VBUS	-	Detect connect/disconnect of USB
2	D-	I/O	USB data (-)
3	D+	I/O	USB data (+)
4	N.C		
5	GND	-	GND

2   Electronic characteristic

Parameter	Signal	Conditions	Min.	Max.	Unit
Power supply voltage					
	VBUS		4.40	5.25	V
Input level					
Differential input sensitivity	VDI	|(D+)-(D-)|	0.2		V
Differential common mode range	VCM	Including VDI	0.8	2.5	V
Single end receiver threshold	VSE		0.8	2.0	V
Output level					
"L"Level	VOL	RL of 1.5kΩ to 3.6V		0.3	V
"H"Level	VOH	RL of 15kΩ to GND	2.8	3.6	V

(1) Pin layout

Connector: CVILUX CH87102HA00 or equivalent
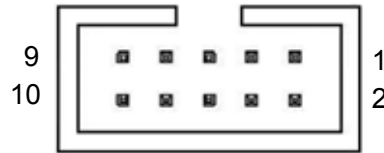
Pin	Signal	Direction	Function
1	N.C	——	
2	DTR	——	DSR loop connect
3	RxD	Input	Serial data input
4	RTS	Output	Request to send
5	TxD	Output	Serial data output
6	CTS	Input	Clear to send
7	DSR	——	DTR loop connect
8	N.C	——	
9	GND	——	
10	N.C	——	

DTR is used to control data transmission to some host systems.
When the host system is communicated by DTR, use loop connect of the host system.

(2) Conditions

Baud rate: 1200 to 115200bps
Parity: None, Odd, Even
Bit length: 7, 8 bit
Busy control: Hardware control(RTS/CTS/Software control(XON/XOFF)

(3) Hardware control

High/Low of RTS signal is used to control data transmission to the host system.
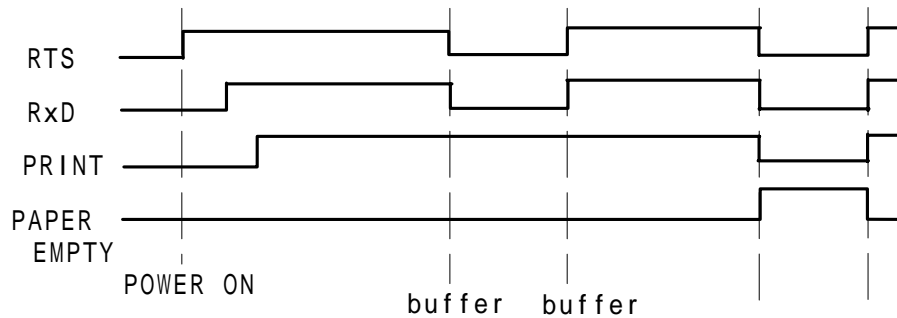RTS signal becomes low if the receiving buffer is filled out curtain level (   )
The host side should stop sending data if RTS signal is low. If the data in the input buffer is
reduced to curtain level, RTS signal goes high and re-start sending remained data (   )

```
RTS     ____|‾‾‾‾‾‾‾‾‾‾‾‾|____|‾‾‾‾‾‾|____|‾‾
RxD     _____|‾‾‾‾‾‾‾‾‾|____|‾‾‾‾‾‾|_____|‾‾
PRINT   _____|‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾|____|‾‾
PAPER   _____|‾‾‾‾|____
EMPTY
        POWER ON              buffer  buffer
```

(4) Software control(XON/XOFF)

Xon(11H)   Xoff(13H) signal is used to control data transmission to the host system.
Xoff signal is sent to host system if the receiving buffer is filled out curtain level.(   )
The host side should stop sending data if Xoff signal is received. If the data in the input
buffer is reduced to curtain level, Xon signal is sent to the host system and re-start sending
remained data (   )

```
RTS     ____|‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾
            Xon            Xoff  Xon      Xoff  Xon
TxD     ____|‾|_____|‾|___|‾|_____|‾|___|‾|___
RxD     _____|‾‾‾‾‾‾‾‾‾‾|____|‾‾|_____|‾‾‾‾|__|‾‾
PRINT   _____|‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾|____|‾‾
PAPER   _____|‾‾‾‾|____
EMPTY
        POWER ON           buffer  buffer
```
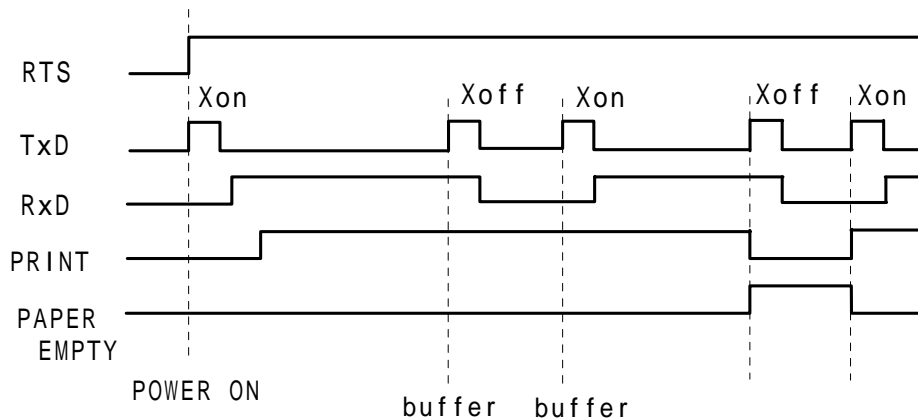
5   Conditions of input / output signal

Item	Condition	Rate value			Unit
		Min.	Typ.	Max.	
High input voltage	RxD CTS	+2.8	—	+15	V
Low input voltage	RxD CTS	-15	—	-2.8	V
High output voltage	TxD RTS (RL=3KΩ)	+5	—	+15	V
Low output voltage	TxD RTS (RL=3KΩ)	-15	—	-5	V

5- 3   Power supply

(1) Pin layout

    Connector   Hirose DF1BZ-4P-2.5DS or equivalent
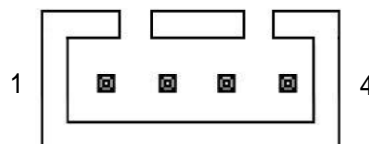
Pin	Signal	Direction	Function
1	DC+		Power supply (+)
2			
3	DC-		Power supply (-)
4			

Depending on printing data, large peak current runs in the power cable.
Consider the voltage drop caused by cable impedance and allow enough margin
when choosing the power cable.

6 Label print

There is the label mode to print the label paper and the receipt paper with black mark. Optional gap sensor (Transparent photo interrupter) and black mark sensor (Reflective photo interrupter) are sensed to top of label form.

1 Set up label printing

1. Set COMMON SETTING in the memory switch. (Refer to IV-5 Memory switch)
   Select the type of sensor by SELECT SENSOR.
   Enable MARKING DETECTION
   Enable MARK RE-DETECTION

2. Set the default value of initial printing information by DC2 L command.
   The information includes label length, gap, stopping position after printing label and top of form.

3. Sensitivity of embedded sensor is changed by the DC2 mrk command.
   Adjust sensitivity according to labels. (Refer to command reference I-16)

4. Press FEED button or send DC2 B   DC2 I when the sensor is enabled to re-detect marking position after replacing the paper or turn the printer power ON.

5. The sensor is detected as paper empty if marking width is beyond 8mm.

6. Command for labels are listed in "Command Reference   -16. Label"

2 Label mode

There are intermittent label mode and continuous label mode installed in the printer.

1. Intermittent label mode

Feed each label to the position of the paper cutter. The printer prints the next label after back feeding the label. This mode is useful to remove each label by each print.

Always retain the base paper. If the base paper is cut and the distance between edge of the base paper and the front of the label becomes shorter than 15mm, the label paper is peeled off while back feeding.

Note1.   Adjust the cut position by command **DC2 L**.
Note2.   Set the amount of back feed not beyond back feeding limit and DC2 L n3.
Note3.   Thickness and length of labels and base papers may cause unexpected results during back feeding. Please make sure the label paper works for back feeding.

2. Continuous label mode

   Prints each label continuously without back feed when label paper cannot be fed to
   the correct cutter position or it is hard to cut the label at the stopped position.
   It is recommended to choose this mode when the height of the label is relatively short or
   back feeding cannot be performed.
   Refer to the command setting for DC2 L / n3 n4 parameter 0.

3 Setting the media

   Peel off labels within15mm from the end of the media and set the end emerging 10mm from
   the cutter. This prevents the label from sticking inside of the printer.

4 Receipt paper with black mark

   Recommend designing black marks on the receipt as shown in below.
   No gap type continuous label should use the same design.
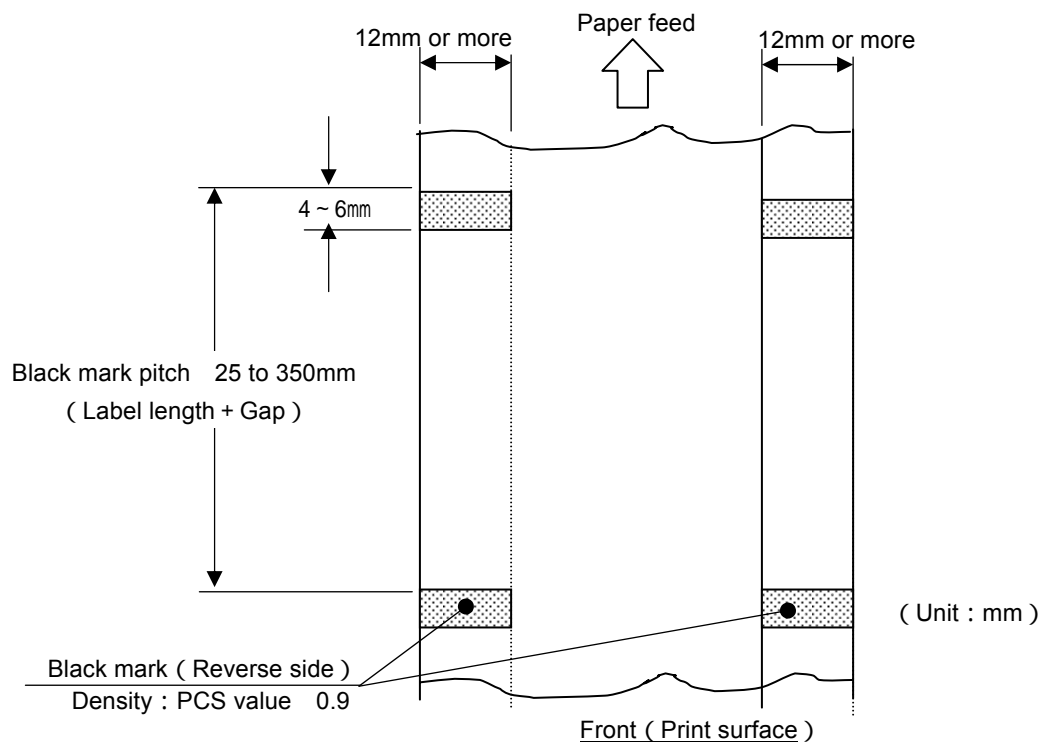
⚠	If PCS of black marks is less than 0.9, black marks are not sensed and the page might be skipped or the right length not detected. It causes the failure of sensing. Prohibit pre-printing in the area designated for black marks. There is a feed tolerance ±2% between calculated value and actual length. Please take into account this tolerance when pre-printed paper is used.

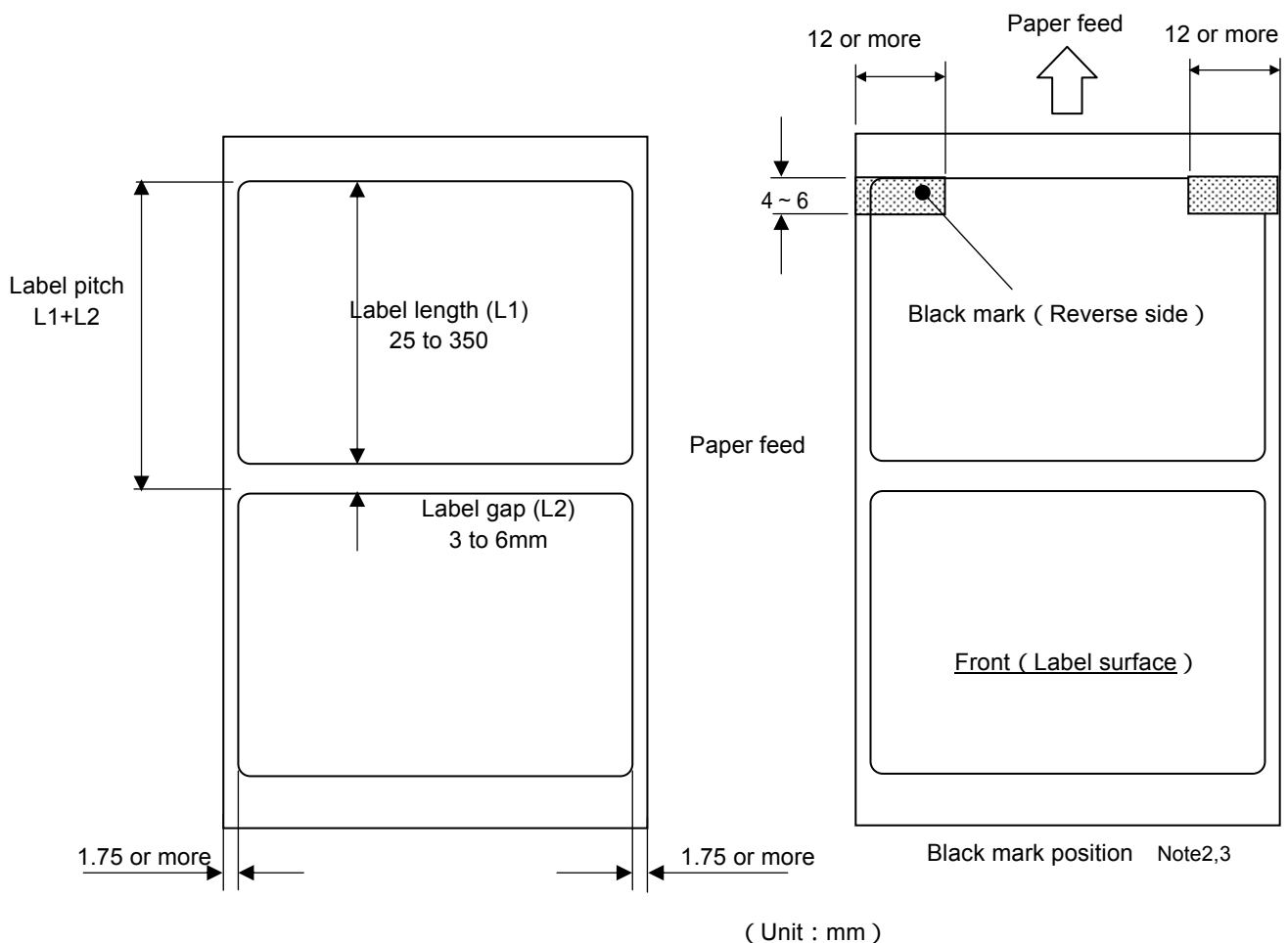   The position of black mark is decided by that of black mark.
   When 58mm 60mm width paper is used, the black mark sensor is installed on left side.

5 Label specifications

SK1-31 prints label paper with black marks and without black marks.
Use label paper complying with the following conditions.

Item	No black mark	With black mark
Recommendable media	HW76B　Nippon Paper Ind. 　Length:　　　　　　　　　　　94μm 　Thickness of base paper:　60μm 　Color on base paper:　　White 　Total thickness:　　　　　154μm or less　incl. adhesive	
Roll diameter	Φ102mm or less	
Label core	Φ25.4　Internal dia.　×Φ31.4　External dia.　mm	
Base paper width	57.5±0.5mm　59.5±0.5mm　79.5±0.5mm	
Label width	54±0.5mm　56±0.5mm　76±0.5mm	
Length	25 to 350mm	
Label gap	3 to 6mm	0 to 6mm
Rolling up direction	Label surface is outside of a roll	
Black mark size		Width　12mm or more Length　4 to 6mm
Density of black mark		Ink　Reflective ratio should be 7　or less.

Label pitch
L1+L2

Label length (L1)
25 to 350

Label gap (L2)
3 to 6mm

Paper feed

1.75 or more　　　　1.75 or more

12 or more　　Paper feed　　12 or more

4　6

Black mark　　Reverse side

Front　Label surface

Black mark position　Note2,3

Unit　mm

Note 1. Above illustration shows the paper width 80.0mm..

Note 2. The position of black mark is decided by that of black mark.

Note 3. When 58mm　60mm width paper is used, the black mark sensor must be installed on left side.

6 Printing area

3±2 Left margin

3±2 Right margin

2.5 or more   Upper margin

Print area

2.5 or more   Lower margin
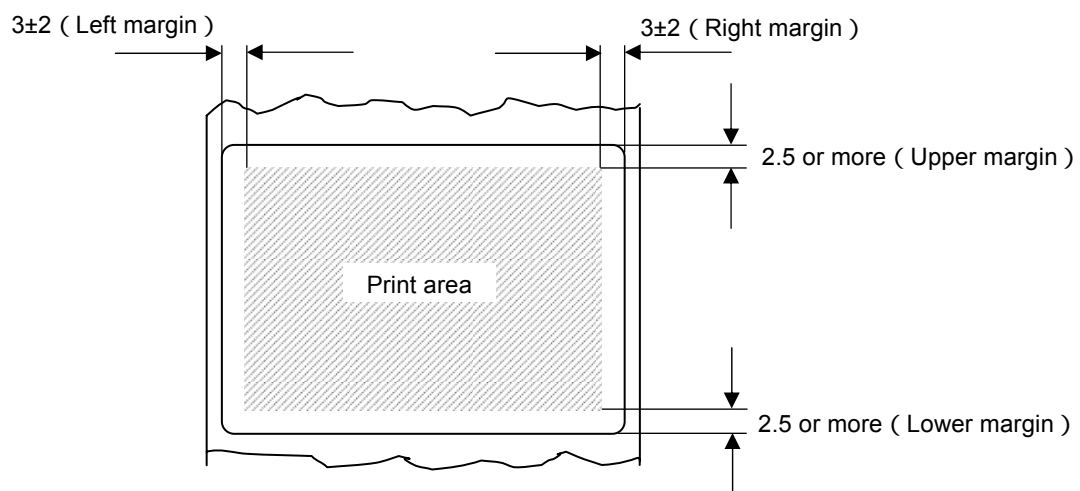
Unit   mm

⚠	The tolerance of the embedded sensor and initial printing position varies about ±2mm from calculated position. Take into account the tolerance of paper feed about ±2% when a label is designed.

7 Maintenance

7-1 Maintenance

Periodically clean the printer to maintain the printing quality and avoid failures. It is recommended to maintain the printer every 6 months or 1 million lines of printing.

1. Print head
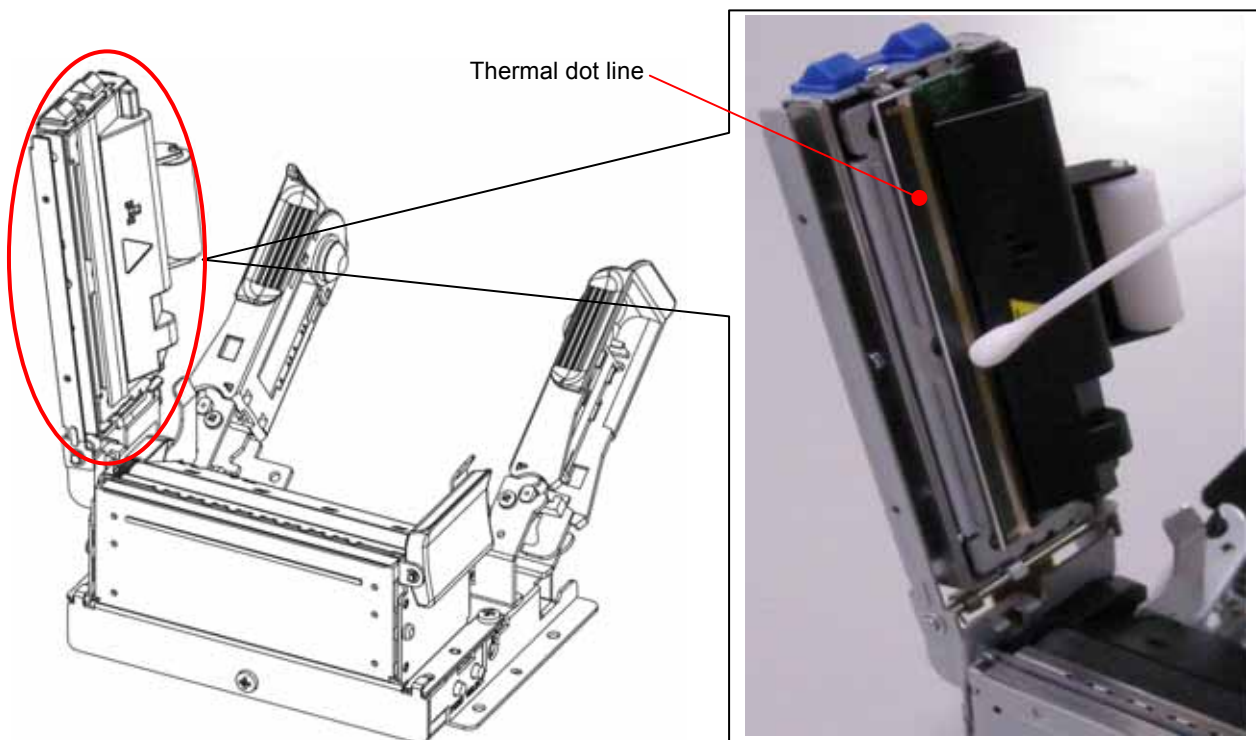   When cleaning the thermal dot line on the print head, use a cotton swab with alcohol (ethanol, methanol or Isopropyl alcohol) and wipe off stains and dust.

Thermal dot line

2. Platen roller
   When cleaning the platen roller, use a dry soft cloth and wipe off the stain with rotating the roller.

3. Sensor and peripherals
   Clean the stain, dust and paper powder on the paper empty sensor and paper cover sensor.

⚠ Prior to maintenance work, be sure to turn OFF the printer.
Avoid cleaning the print head immediately because the print head is hot.
  Start maintenance work after the thermal head becomes cool.
Do not touch the print head with fingers directly. It may cause damage by
  electrostatic discharge and contamination.
Do not touch the thermal head dot line with bare hands or metal objects.
Do not use volatile chemical agents, such as thinner and benzene.
Do not get moisture or spill liquids inside of the printer.
Turn ON the printer only after alcohol is completely dried.

7- 2   Service for trouble shooting

For maintenance and service, please contact your Sanei local distributors or the following address.

Sanei Electric Inc.
Overseas sales division
5F. Taisou-Ikebukuro Bldg
2-61-1 Ikebukuro, Toshima-Ku, Tokyo 171-0014, Japan
TEL: 81-3-3986-1188
FAX: 81-3-3988-5876

8 Command systems

Command systems are compatible with ESC/POS.
The details please refer to separate volume "command reference".

8-   Command table

1. Paper feed command

Command	Standard mode	Page mode
CR	Carriage return / Line feed	Retrieve page memory / Carriage return
LF	Carriage return / Line feed	Retrieve page memory / Carriage return
FF	Page length printing	Printing in page mode and returning to standard mode
ESC C	Set the page length	Setting only
ESC J	Printing and feed forward	Move Y axis in the forward direction
ESC j	Printing and feed backward	Move Y axis in the backward direction
ESC d	Printing and consecutive line feed	Consecutive line feed

2   Tab command

Command	Standard mode	Page mode
HT	Horizontal tab	
ESC D	Set horizontal tab	

3   Format command

Command	Standard mode	Page mode
ESC 2	Set the initial linefeed value	
ESC 3	Set the linefeed value	
ESC SP	Set the left margin	
GS L	Set the right margin	Setting only
GS W	Set the printing area width	Setting only
ESC $	Set absolute position of the Printing area	Setting only
ESC a	Align the position	

4   Character modification command

Command	Standard mode	Page mode
ESC !	Modify character specifications in a batch	
ESC G ESC E	Specify the bold character / cancel	
ESC {	Specify inverse printing / cancel	Specify inverse printing / cancel
ESC -	Specify underline / cancel	
GS !	Set a character size	
GS B	Specify the black and white reverse character / cancel	

5 Character Selection Command

Command	Standard mode	Page mode
ESC M	Choose a character font	
ESC R	Choose an international character	
ESC t	Choose the character code table	
ESC &	Erase a download character	
ESC ?	Specify and cancel a download character	
ESC %	Choose an international character	

6 Bit Image Command

Command	Standard mode	Page mode
ESC *	Specify the bit image	
GS *	Register the downloaded bit image	
GS /	Print download bit image	
DC2 V	Print Raster bit image	
DC2 v	Print compressed raster bit image	

7 Page Mode Command

Command	Standard mode	Page mode
ESC L	Select the page mode	Invalid
ESC S	Invalid	Select the standard mode
ESC FF	Invalid	Print all page mode memories.
CAN	Erase the print buffer	Clear page mode memories
ESC T	Invalid	Select printing direction and initial position
ESC W	Invalid	Defining the print area

8 Peripheral Equipment Command

Command	Standard mode	Page mode
ESC =	Select the peripheral equipment	
ESC c 3	Select valid and invalid for paper empty signal	
ESC c 5	Valid and Invalid of panel switch	
ESC i	Full cut	
ESC m	Partial cut	
GS V	Cut the paper	

9. Response Command   Installed in Serial interface

Command	Standard mode	Page mode
GS a	Valid / Invalid of automatic status transmission	
GS r	Transmit status	
GS E	Answer the string	
GS R1	Check printer status	

10　Kanji Command (2 byte code)

Command	Standard mode	Page mode
FS &	Specify the Kanji mode	
FS .	Cancel the Kanji mode	
FS C	Choose the Kanji code system	
FS S	Set the inter character space	
FS !	Specify the batch mode	
FS -	Set and cancel the underline	
FS W	Specify and cancel the double-height and double-width	
FS 2	User defined character registration	

11　Printing Image Registration Command

Command	Standard mode	Page mode
FS Q	Specification of image registration onto the nonvolatile memory	
FS R	Image registration canceling in the nonvolatile memory	
FS O	Printing the image registered in the nonvolatile memory	
FS P	Canceling of printing of the image registered in the nonvolatile memory	

12　Ruled Line Command

Command	Standard mode	Page mode
DC3 A	Choose ruled line buffer A	
DC3 B	Choose ruled line buffer B	
DC3 C	Clear the ruled line buffer	
DC3 D	Write dot specification to the ruled line buffer	
DC3 L	Write line specification of the ruled line buffer	
DC3 +	Enable the ruled line printing mode	
DC3 -	Disable the ruled line printing mode	
DC3 P	Execute printing of 1 dot ruled line	

13　Function Setting Command

Command	Standard mode	Page mode
ESC	Initialization	
DC2 D	Reserve and release a download character registration area	
DC2 G	Reserve and release a user-defined character registration area	
DC2	Set printing density	
DC2 K	Set the memory switch	

14　Barcode Command

Command	Standard mode	Page mode
GS H	Set the HRI character printing	
GS h	Set the barcode height	
GS w	Set the barcode width	
GS k	Print barcode	

15 2D Barcode Command   Option

Command	Standard mode	Page mode
GS Q	Print two dimensional barcode PDF417, MicroPDF417, DataMatrix, MaxiCode, QRCode	
GS S	Change the cell size	

16 Label Command

Command	Standard mode	Page mode
DC2 L	Set the label	
DC2 I	Detect marking position	
DC2 B	Re-detect marking position	
DC2 mrk	Set marking threshold	

PC437 system

High-order bit / Low-order bit		0	1	2	3	4	5	6	7	8	9
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001
0	0000		DLE	SP	0			`		Ç	É
1	0001			!	1					ü	æ
2	0010		DC2	"	2					é	Æ
3	0011		DC3	#	3					â	ô
4	0100	EOT		$	4					ä	ö
5	0101	ENQ		%	5					à	ò
6	0110			&	6					å	û
7	0111			'	7					ç	ù
8	1000		CAN	(	8					ê	ÿ
9	1001	HT		)	9					ë	Ö
A	1010	LF		*	:					è	Ü
B	1011		ESC	+	;					ï	¢
C	1100	FF	FS	,						î	£
D	1101	CR	GS	-						ì	
E	1110			.					~	Ä	₨
F	1111			/	?				SP	Å	ƒ

High-order bit / Low-order bit		A	B	C	D	E	F
		1010	1011	1100	1101	1110	1111
0	0000	á	▒				
1	0001	í	▒				±
2	0010	ó	▓				≥
3	0011	ú			∟		≤
4	0100	ñ			∟		⌠
5	0101	Ñ			┌		⌡
6	0110	ª			┌	µ	÷
7	0111	º	┐				≈
8	1000	¿	┐				
9	1001	┌					
A	1010	┐					·
B	1011	½			■		
C	1100	¼			▬		ⁿ
D	1101	¡	┘		▌	Ø	²
E	1110	«	┘		▐		■
F	1111	»			▬		SP

SP indicates space.
A code in the blank section is ignored.
The content in a bold frame is a function code.

Note: The character code table indicates bits arranged in the shape of a character and does not represent an actual printing pattern.

Low-order bit	High-order bit →	0 0000	1 0001	2 0010	3 0011	4 0100	5 0101	6 0110	7 0111	8* 1000	9* 1001
0	0000		DLE	SP	0			`		▬	
1	0001			!	1					▬	
2	0010		DC2	"	2					▬	
3	0011		DC3	#	3					▬	
4	0100	EOT		$	4					■	
5	0101	ENQ		%	5					■	
6	0110			&	6					■	
7	0111			'	7					■	|
8	1000		CAN	(	8					|	
9	1001	HT		)	9					|	
A	1010	LF		*	:					▮	
B	1011		ESC	+	;					▮	
C	1100	FF	FS	,						■	⌐
D	1101	CR	GS	-						■	`
E	1110			.					~	■	`
F	1111			/	?						⌡

Low-order bit	High-order bit →	A 1010	B 1011	C 1100	D 1101	E* 1110	F* 1111
0	0000	SP				≡	×
1	0001					╠	
2	0010					╪	
3	0011					╡	
4	0100					◣	
5	0101					◤	
6	0110					◥	
7	0111					◢	
8	1000					♠	
9	1001					♥	
A	1010					♦	
B	1011					♣	
C	1100						
D	1101						
E	1110						▓
F	1111						

SP indicates space.
The code in the blank section is ignored.
The content in a bold frame is a function code.

*A character in a row marked with * is not printed in the SHIFT JIS CODE.

PC850 system

Low-order bit		High-order bit: 0 0000	1 0001	2 0010	3 0011	4 0100	5 0101	6 0110	7 0111	8 1000	9 1001
0	0000		DLE	SP	0			`		Ç	É
1	0001			!	1					ü	æ
2	0010		DC2	"	2					é	Æ
3	0011		DC3	#	3					â	ô
4	0100	EOT		$	4					ä	ö
5	0101	ENQ		%	5					à	ò
6	0110			&	6					å	û
7	0111			'	7					ç	ù
8	1000		CAN	(	8					ê	ÿ
9	1001	HT		)	9					ë	Ö
A	1010	LF		*	:					è	Ü
B	1011		ESC	+	;					ï	ø
C	1100	FF	FS	,						î	£
D	1101	CR	GS	-						ì	Ø
E	1110			.					~	Ä	×
F	1111			/	?					Å	ƒ

Low-order bit		High-order bit: A 1010	B 1011	C 1100	D 1101	E 1110	F 1111
0	0000	á	▒		Đ	Ó	-
1	0001	í	▓		Đ	ß	±
2	0010	ó	▓		Ê	Ô	≥
3	0011	ú			Ë	Ò	¾
4	0100	ñ			È	õ	¶
5	0101	Ñ	Á		€	Õ	§
6	0110	ª	Â	ã	Í	µ	÷
7	0111	º	À	Ã	Î	Þ	¸
8	1000	¿	©		Ï	þ	°
9	1001	®				Ú	¨
A	1010	¬				Û	·
B	1011	½			■	Ù	¹
C	1100	¼			▬	ý	³
D	1101	¡	▪		¦	Ý	²
E	1110	«	◣		Ì	¯	■
F	1111	»		¤	▬	´	

SP indicates space.
A code in the blank section is ignored.
The content in a bold frame is a function code

Note: The character code table indicates bits arranged in the shape of a character and does not represent an actual printing pattern.